ELECTRICAL WEST

A McGRAW-HILL PUBLICATION

April 1959
50 Cents

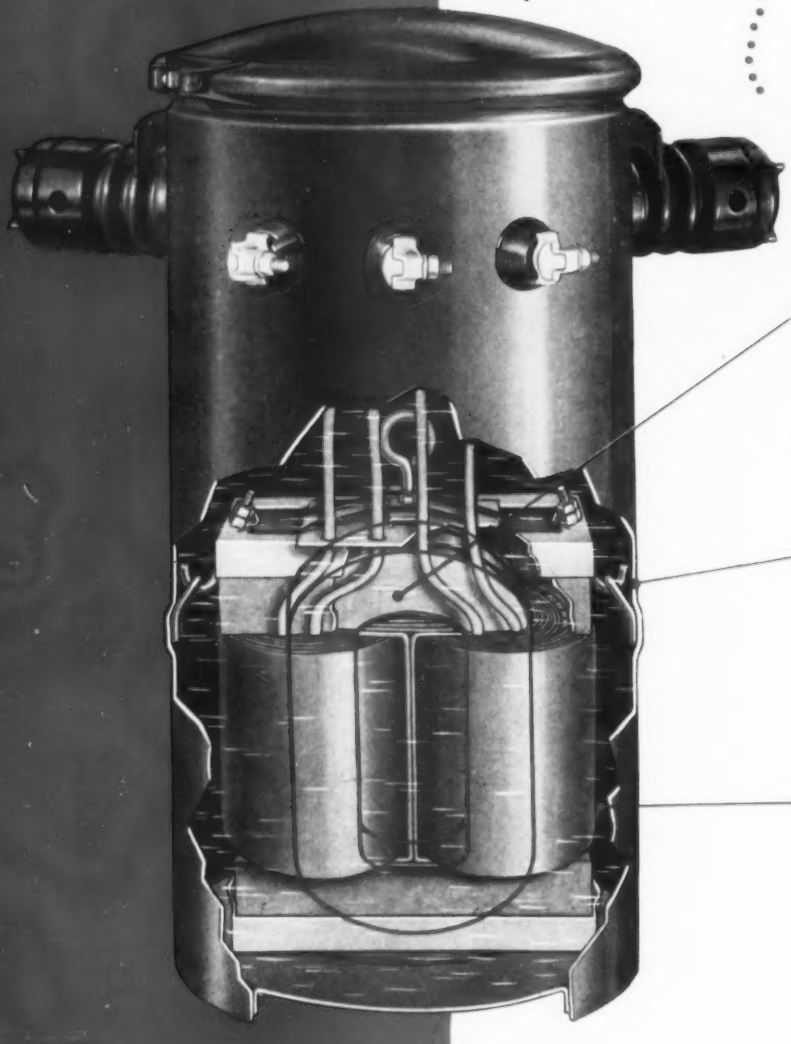
A Million Kw for Western Industry

RT&E

engineering talent concentrated on transformer CORE development

provides

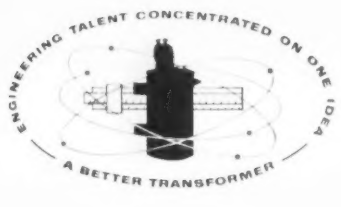
- **Lower Core Loss**
- **Uniform Performance Characteristics**
- **Quieter Operation**
- **Easier Repairability**
- **Lighter Weight**



The R T & E wound core represents the newest innovation in core construction in over 20 years. It is constructed of the finest grain-oriented steel available, formed into a compact core of single turn laminations with butted joints. It has set new standards for lower core losses, quietness of operation, uniformity of performance and easier repairability.

Two "J" bolts fasten the assembly securely to tank wall and exert a downward pull on the upper core clamp. The compressive force produced clamps the full-span coil blocks firmly against the coil sections for added short circuit strength.

The unique R T & E method of fastening the core-coil assembly in the transformer tank eliminates the need for conventional side braces by utilizing the tank wall for this purpose. Elimination of these side braces exposes more coil surface to the oil, and provides an unobstructed path for oil circulation through the coil ventilating ducts.



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Employees Speak Up — The San Diego Gas & Electric Co. has just completed tabulating its second employee opinion poll which was conducted by the Industrial Relations Section of the California Institute of Technology. Moreover, the results of the entire poll were published in the company's publication, the *News Meter*, so that the entire organization could assess the group consensus. The poll was divided into five major categories, the employees being questioned on their feeling about personnel practices, conditions and benefit plans; employee and fringe benefits; company communication; supervision; and company and business in general.

The answers to the questions are revealing but they can best be interpreted at the executive level of the company. **The main point is that the company is making an effort to determine employee attitudes on these very important points and lets "the chips fall where they may" in publishing the answers.** This in itself is good communications. Out of such procedures can come the policies that build morale and esprit de corps to the high levels essential for all public service organizations.

Area Development Note — Around the country are a large number of obsolete military installations which have had to bow to the advancing technology of the Space Age. Rather than look upon such sites as white elephants and tax eaters, **many communities have been able to convert former bases into attractive industrial sites that bring pay rolls, jobs and taxes to the community.**

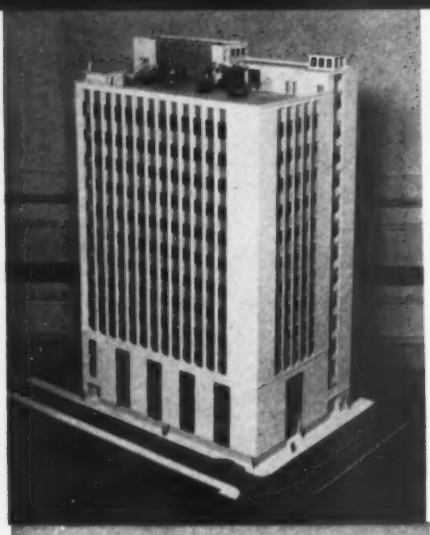
Generally these sites already have ample service facilities such as water supply, sewers, electrical power and transportation already available. Generally, also, they are far enough away from residential areas to eliminate many of the objectionable aspects of some industrial installations. In fact, such sites incorporate many of the basic advantages that progressive communities seek in following the new trend toward a more controlled community development program. Maybe the day will come when communities will be looking forward to the abandonment of nearby military installations rather than complaining to their congressman when the Defense Department announces the abandonment of surplus or obsolete facilities.

Danger Signal — Three Democratic senators have recommended a $300,000 study into "the electric power supply situation of the U. S. and recommended legislation to assure development and organization of bulk power supply. . ." **Senator James Murray (D—Montana), one of the sponsors, call for a giant power grid, particularly in the Western states, to produce the greatest efficiency and economy in power production.**

Leland Olds, former Federal Power Commission chairman, is reported to be pushing hard for such a study and has long advocated a giant federal power transmission network that would blanket the country and "integrate" all the basin authorities.

It is not to be denied that additional links in a high voltage transmission network might be economical. Eventually it is conceivable that such a network literally might blanket the country. However, the grave danger to the country would be to permit this vast facility to be owned, operated and controlled by the federal government.

The industry already has amply demonstrated that it can operate vast energy pools and transmission systems on an integrated basis but with individually owned transmission links. **If economics are permitted to prevail, the development of a national power grid will continue on the basis that it is equitable for everyone.**



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Maximum Rental Space 75

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ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S. Established 1887

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The Cover—Load dumping with solid state control device is a newcomer to the electrical industry. The thermofor catalytic cracker shown on the cover is part of the Richmond refinery of Standard Oil Co. of California, and represents both industry growth and part of an industrial complex that can be "dumped" by solid state control. See p 62.

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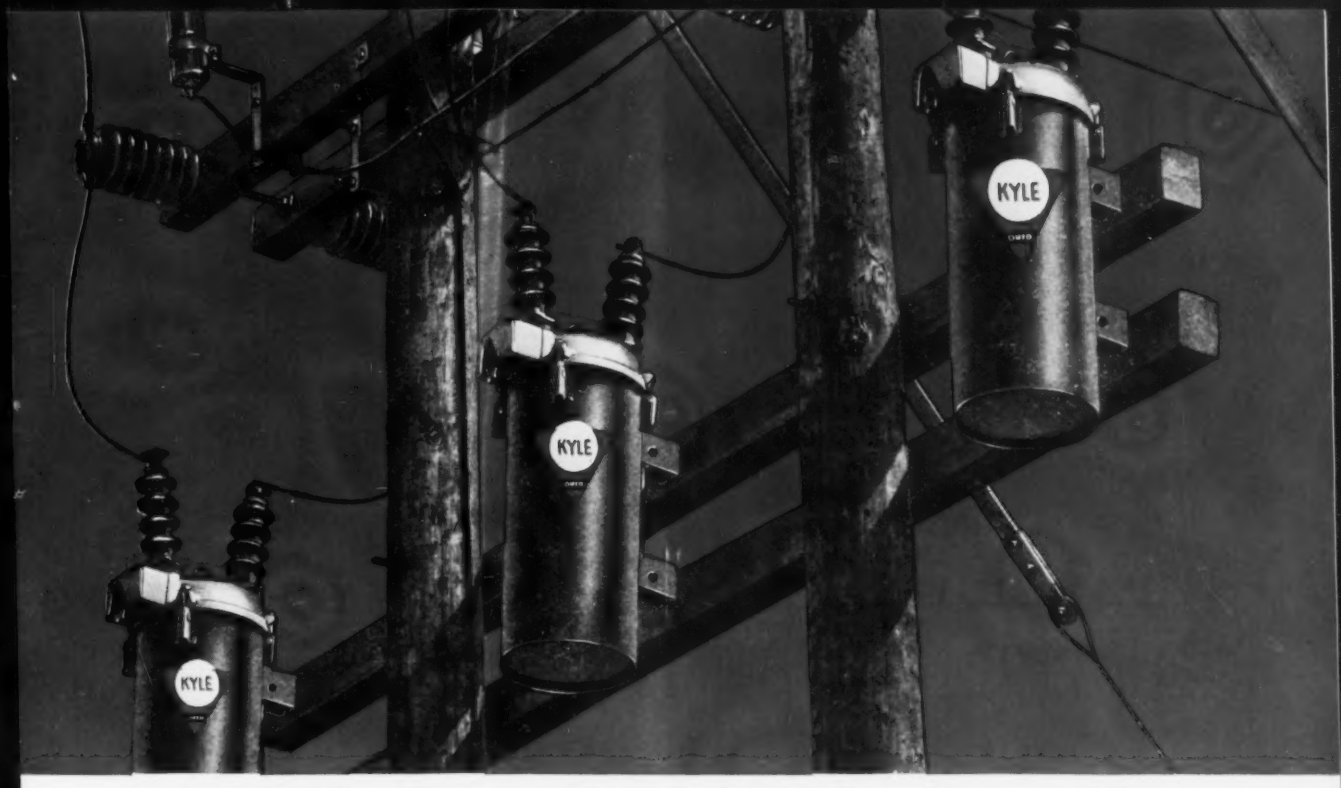


L-M Kyle Type E 23 KV Recloser Now Interrupts 2500 Amps; Other Changes

More precise hydraulic mechanism; finger-tip choice of sequences; simplified contact construction permits conversion from 2.3 to 23 kv without changes.

By **LYLE McNULTY**
Application Engineer, Kyle Reclosers
Line Material Industries

L-M's Type E power class recloser has recently been improved to provide greater flexibility and convenience, a wider range of applications, higher interrupting capacity. Three Type E's may be electrically interlocked to provide 3-phase lockout when any one phase locks open.

Higher Interrupting Capacity

The Type E now provides interrupting ability 40 times coil rating, with a maximum of 2500 amperes, symmetrical, over the entire application range from 2.3 to 23 kv, without any addition or removal of parts.

Sequences Easily Changed

New, more precise and more versatile hydraulic mechanism. Improved timing control. Finger-tip choice of sequences. These can be changed in the field without special tools or any parts.

Simplified Construction

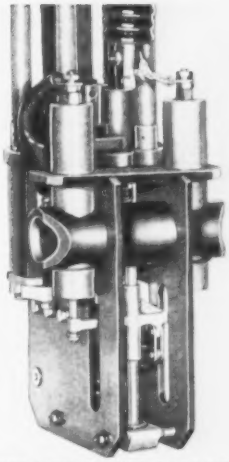
Contact buffer assembly simplified. No changes are necessary to convert from 2.3 to 23 kv in the field. Two identical contact tubes simplify maintenance, cut maintenance costs.

Improved Arc Extinction

Arcing chambers designed to give quick interruption with minimum of arc energy at high fault currents, and to provide supplementary oil turbulence required for lower fault currents.

Get Complete Information

The new Type E provides the same high-quality performance that has made Kyle Reclosers the undisputed leaders in the field. Ask the L-M Field Engineer for Bulletin CR1B on the New Type E, and information on other Kyle Reclosers, including Kyle-Klad equipment. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.



THE NEW HIGHER-CAPACITY arc-interrupter mechanism handles up to 2500 amperes at 23 kv. Two vented arcing chambers. Double break contacts driven by toggle spring to insure rapid opening and closing. Moving contacts have separate load transfer and arcing surfaces to insure long wear.

LINE MATERIAL® Industries Kyle® Reclosers
McGRAW-EDISON COMPANY

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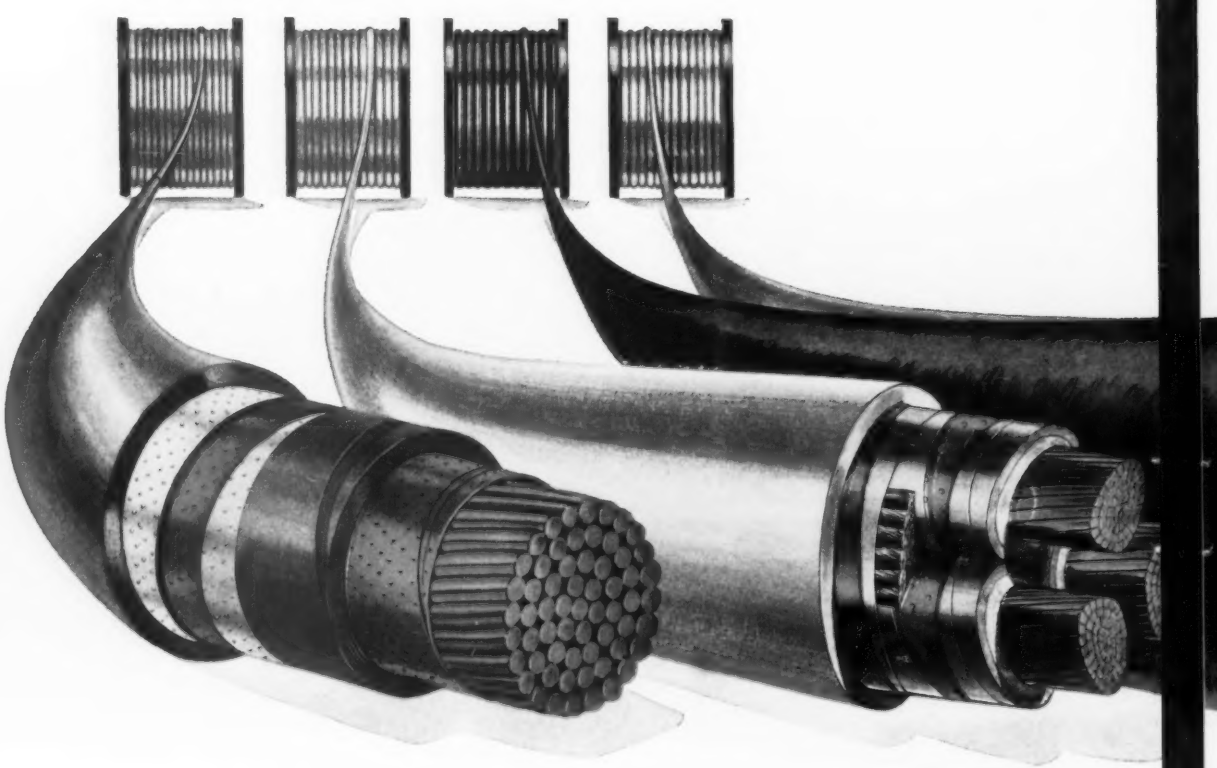


Single conductor, 1 KV and up

Three-conductor, 1 KV and up

For phone number of closest representative see advertising index in back of book.

DODGE!

Phelps Dodge paper-insulated power cables have a *demonstrated record* of long life in a great variety of designs for all types of applications—underground duct, direct burial, submarine and aerial.

Paper-insulated cables have these important inherent characteristics that improve operating performance and lengthen service life:

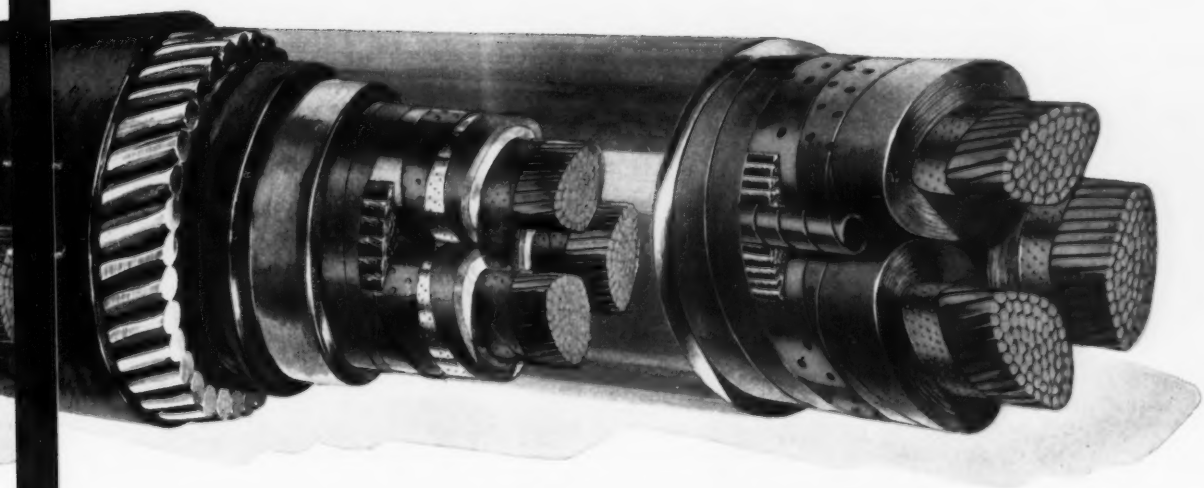
- Extra high 60-cycle and impulse strength to withstand switching and lightning surges.
- Ability to handle large blocks of power in single cables of minimum dimensions.
- Positive protection against all contaminations, due to being hermetically sealed in an extruded metallic sheath.

Paper-insulated cables can be supplied with either lead or aluminum sheaths.

Phelps Dodge offers the widest range of high voltage cables to the electrical industry.

PHELPS DODGE COPPER PRODUCTS CORPORATION

300 PARK AVENUE, NEW YORK 22, NEW YORK



Submarine, 1 KV and up

Low-Pressure gas-filled, 8 KV and up

MEET THE MAN

. . . who's dedicated to **your** job
. . . who knows your needs
. . . who knows your problems
. . . who knows wire and cable
. . . who is backed by engineering specialists
. . . who is backed by a reliable manufacturer

YOUR ROME CABLE SALESMAN

MEET THE MAN

who's dedicated to **your** job

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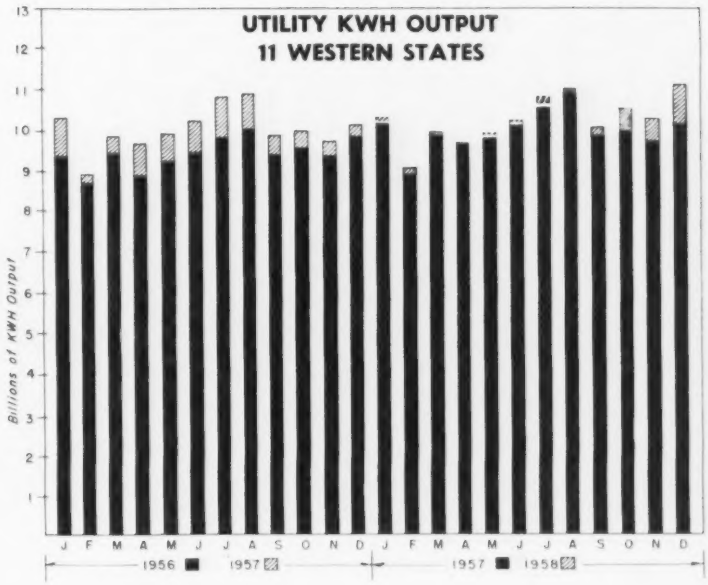


Output Comparisons

Year-to-year Kwh Output Changes in Western Regions and U. S.
Per cent Changes Over Same Week One Year Ago

Week Ending	Rocky Mountain	Pacific Southwest	Pacific Northwest	U. S. Total
Jan. 31	+ 4.8	+ 9.4	+ 8.1	+7.5
Feb. 7	+14.2	+10.6	+10.8	+8.2
Feb. 14	+14.5	+13.6	+14.6	+6.0
Feb. 21	+13.7	+13.0	+14.7	+7.5
Feb. 28	+ 9.9	+ 7.7	+12.5	+9.9

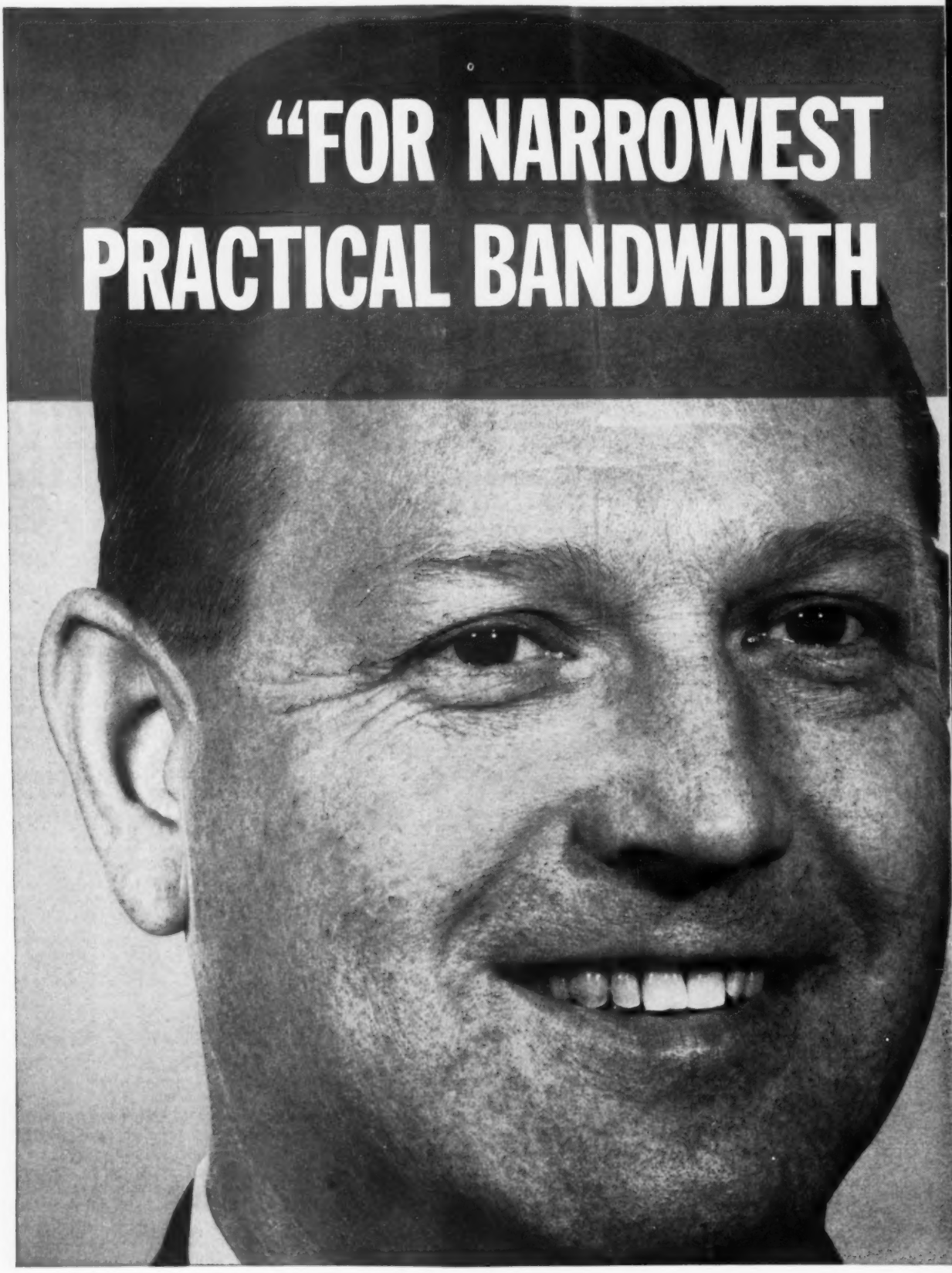
Economic Gains

The first quarter's economy jogged along on the uphill grade to recovery but signs of a spectacular boom are still lacking. **Retail sales are running well ahead of last year and might top last year's first quarter by $5 billion. Electric power output for the nation in recent weeks has been running a comfortable 7 to 9% ahead of last year with the Pacific Northwest showing a 10 to 15% gain over a dull first quarter of 1958. Western industry is spending more than $1 billion this year for plant modernization, expansion and new facilities (see p 55).**

Unemployment is a weak spot in several of the Eastern areas where a combination of cautious rehiring practices plus greater productivity per man-hour has kept employment from keeping pace with the economic recovery. In contrast, civilian employment in the southern half of California has reached a new all-time high.

Spectaculars

Looming large on the construction horizon are many multimillion dollar projects. Warren Air Force Base in Cheyenne will spend up to $20 million for launching facilities; the American Trust Co. in San Francisco is adding a $6½ million unit to its building; at Garfield, Utah, Kennecott Copper plans modernization totaling $10 million. Four new shopping centers for San Jose, Calif., Westminster, Colo., Salt Lake City, Utah, and San Diego, Calif., are estimated to cost more than $11 million; at the Vandenburg Rocket Base near Lompoc, Calif., new facilities will cost over $9 million; housing projects at Salt Lake City, Spokane, Sitka, plus three others in California, each exceed $1 million; at Portland, chemical plant expansion is scheduled to cost $2 million. Looks like good hunting for construction people.



For phone number of closest representative see advertising index in back of book.

Westinghouse URL and URF voltage regulators give you this 3-part system . . .

• Instant-response tap changer

• Inverse-time relay • 1¼% steps"

This three-part arrangement provides the narrowest practical bandwidth and, hence, the best regulation for every system, under every voltage condition. Westinghouse URL and URF regulators, engineered with all practical limitations in proper perspective, combine (1) instant-response, geneva gear driven tap changing, (2) inverse-time relaying and (3) 1¼% steps.

Practical limitations on bandwidth

Theory may ignore practical limitations, but an engineer looking for peak performance cannot. For example, theory once held that very narrow bandwidths could be set because of the infinitesimal voltage changes possible with induction regulators. Experience proved otherwise, however, because system voltages do not follow a straight line trend. Closer relay band settings result in random voltage changes exceeding the band limits more frequently, causing increased regulator operations. This determines *practical* minimum bandwidth.

Reduced operations on narrow band setting

Bandwidth reduction results in more tap changer operations. For example: On a typical system, a bandwidth reduction from 3 volts to 2 volts, with no change in time-delay setting, caused increased operations for both a ⅝%-step and a 1¼%-step regulator. But even here, the 1¼%-step unit with inverse-time relay held operations to only 64% of those for the ⅝%-step regulator with 60-second fixed time delay.

For both the Westinghouse URL and URF regulators, a range of time-delay multiplier settings from 1 to 5.5 permits control of the number of tap changer operations on narrow bands—without sacrificing high-speed corrections on large voltage changes.

Unique control permits 1¼% steps on narrowest practical bandwidth

Conventional control systems using a balanced-beam type voltage relay usually require a holding voltage to minimize contact burning. This requires additional bandwidth in relay settings. The exclusive Westinghouse CVR relay requires no holding band—therefore, it is possible to set URL and URF regulators to bandwidths between 1½ and 2 volts, while retaining the advantages of 1¼% steps.

Thus, the three-part system of Westinghouse URL and URF regulators permits smaller practical bandwidths, minimum maintenance, maximum life and maximum circuit protection.

Ask your Westinghouse representative for further details on the bonus values from Westinghouse URL and URF regulators. J-70856

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

H. F. Barsun, Manager, Regulator Engineering, Westinghouse Electric Corporation, presents an engineering approach to narrow bandwidths.

For phone number of closest representative see advertising index in back of book.

EW news roundup

TURNOVER TOLL—The high cost of replacements is something that every supervisor and manager should be completely aware of.

The American Management Assn. has just completed a survey indicating that it takes $800 to recruit, process, orient and train a highly skilled secretary. A journeyman machinist replacement costs about $400; getting a good salesman on a productive basis ranges from $800 to $1,500 and it takes $10,000 to replace a highly trained scientist or engineer.

These are hidden costs that cut into the profit showing of a business on many fronts.

—EW—

SMALL CROP – Official figures from the American Society for Engineering Education indicate that the enrollment in 153 accredited American engineering colleges was down 2.9% over last year—and the freshman class was 11.6% smaller. Graduate study in engineering, however, increased sharply with 27,456 students being enrolled in master's degree programs and 4,762 (up 14.3%) in working for doctor's degrees.

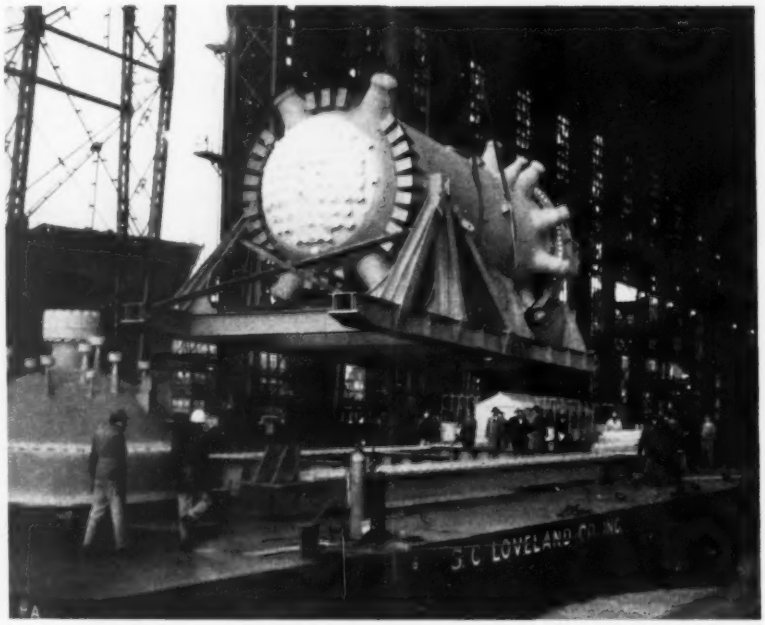
Electrical engineering was the most popular engineering field with 8,700 bachelor's degrees being awarded in 1957-58. Women engineering students still account for less than 1% of the total enrollment.

—EW—

MARKUP—Two San Francisco Chinatown businessmen were accused recently of bilking an American foreign aid program of $95,430 in the sale of five electric generators to the kingdom of Laos.

The two men purchased the diesel generators in San Francisco for $21,000, and resold them in a complicated transaction for $116,430.

They have been indicted by the Federal Grand Jury, and it's highly probable that the big markup is less valuable to them now than the balmy sunshine of recent weeks.



Largest nuclear power reactor vessel ever constructed, and the heaviest (300 tons) single shipment ever made from the Philadelphia area, is loaded aboard a barge at the New York Shipbuilding Corp. for water shipment to Commonwealth Edison Co.'s Dresden nuclear power station near Chicago. Besides Commonwealth, the Nuclear Power Group includes American Electric Power Co., Bechtel Corp., Central Illinois Light Co., Illinois Power Co., Kansas City Power & Light Co., Pacific Gas and Electric Co., and Union Electric Co. Bechtel is engineer-constructor for the Dresden plant

Plumbers in Detroit are now working on a 24-hour week of three 8-hour days. It is a spread-work device made necessary by the depressed area of business in the automotive capital.

—EW—

ROBOT TRANSPORT—A railway station in England may have the world's first commercial system of driverless trucks. Tractors, called Robotugs, pull heavy loads about the terminal guided entirely by an electric cable laid along the desired routes that the tractors are to follow.

There are built-in safety devices that instantly stop the Robotug if the route is obstructed. Maybe this is a forerunner of the day when our highways will be similarly fitted and drivers become technically obsolete.

—EW—

SOFT TOUCH – Featherbedding is a costly practice that the railroads are out to check. Studies show that it costs the railroads $500 million a year to pay firemen with no fires to tend, brakemen with no brakes to handle and switch tenders with no switches to throw.

A classic example of featherbedding is reported in a case where a maintenance-of-way engineer and a fireman also had to be paid for not operating the steam-ditcher. One day the maintenance-of-way fireman didn't show up. The engine-service

Balance . . .

what does it mean in cable?

No one characteristic alone determines good cable. It's the right balance of many qualities that counts. Carol *has* this balance. Look at these significant test results.

	BRAND			
	CAROL	A	B	C
Electrical Insulation Resistance (1)	100	17	16	68
Cold Bend °F (2)	−50	−45	−90	−50
Abrasion Resistance (1)	91	62	100	92
Ozone Resistance (1)	100	6	18	12

Note: (1) 100 indicates best—others % of best (2) cold bend—actual test temperature

As can be seen, needlessly high cold flexibility can be built into cable . . . but only at the sacrifice of more important electrical properties. And in Brands A, B and C you will also note the lack of balance between abrasion resistance and ozone resistance . . . which means these cables can crack long before they wear out.

Carol, on the other hand, has not only the highest *combined* rating but is also the best *balanced*. As a result of years of experience and research, primary emphasis has been placed on the characteristics most vital in cable life and performance.

To you, this means superior quality *throughout* . . . *extra* quality and performance where it is most needed.

when you call for cable— call for

Carol®

PORTABLE CORDS • POWER SUPPLY CABLE • CONTROL CABLES • WELDING CABLE • GOVERNMENT TYPES • CORD SETS

For phone number of closest representative see advertising index in back of book.

fireman had to leave his soap box to do the actual firing. For this he received an extra day's pay for working in addition to his regular pay for not working—all in the same day.

Featherbedding is not confined to the railroads. Other examples include carpenters who refuse to handle prefabricated doors and preassembled windows; painters who can't use sprayers or wide paint rollers; bricklayers who lay only a given number of bricks a day and now even jet liner crews which have to carry an extra pilot. There should be a better way of converting paid idleness to constructive effort.

—EW—

You can pay up to $30 a pound for grease. E. F. Houghton & Co. is marketing special lubricants that work under extreme pressure and temperature. One such product provides adequate lubrication between −40 F and +450 F under pressures greater than 100,000 psi.

Hypersonic planes have skin temperatures and bearing stresses on the ailerons that make these expensive lubricants essential.

—EW—

COLD NIGHT—Word has drifted down from the northland that quite a number of utility advertising men and their wives survived a cold ordeal while en route to the Region 9 conference of the Public Utilities Advertising Assn. at Timberline Lodge, Mt. Hood, Ore.

The bus in which 35 of them were being transported from Portland to the lodge snapped a chain and was unable to make the last six miles up the mountain.

With Portland General Electric's Fred Kempe aiding in thumbing rides for his guests, all but six of the passengers made the lodge before the bus did.

But not all their troubles were over. Only half the baggage was unloaded from the bus when it finally reached the lodge, and it returned to Portland carrying the pajamas and extra shirts of 15 or 20 of the passengers.

Randall A. Johnson, advertising supervisor of Washington Water Power Co., was elected Region 9 chairman. Sherman R. Payne, advertising manager of Arizona Public Service Co., was chosen vice-chairman.

—EW—

BUSY REACTOR – Nearly 11,000,000 kwh of electrical power have been generated by Southern California Edison's steam plant powered by the Sodium Reactor Experiment of Atomics International. The SRE began power operations in July 1957.

A number of associated experiments have been performed concurrently with power operations, and many features of the SRE will be included in a Sodium Graphite Reactor being designed by Atomics International for the generation of 75,000 kw of electricity for Consumers Public Power District of Nebraska.

—EW—

OFF AGAIN, ON AGAIN – Industrial Wholesale Electric Co. wants to expand in Los Angeles.

"No," said the little old lady.

"Yes," said the little old lady.

"No," said the little old lady.

She owns a 170x40-ft strip of property needed for the expansion, and her indecision is proving to be a real bottleneck. This has been going on for about a year now.

"We could start construction tomorrow," owner Bill Lockie says, "if the little old lady could just make up her mind."

—EW—

SMALL PRICE – It would cost less than 1% of total road cost to illuminate virtually all highway danger spots on America's multibillion-dollar interstate highway system, according to Harold A. Olson, a General Electric vice-president.

He pointed out that lighting costs less than mowing roadside grass, yet neither state governments nor federal agencies have taken steps to insure that the sprawling highway network will be properly lighted for safe, efficient, round-the-clock use.

—EW—

SCHOOL COSTS – Among states having the highest costs per pupil in public school systems, eight out of the top 10 are in the West.

Oregon leads with a cost of $356 per pupil, with California second, followed by Wyoming, Nevada, Montana, Washington, Arizona and Colorado in that order.

Here are the Graybar Offices in the West

ARIZONA

Phoenix:	1700 North 22nd Ave. ALPINE 2-2371
Tucson:	212 South Park Ave. TUCSON 2-6439

CALIFORNIA

Fresno:	101 Van Ness Ave. ADAMS 7-4175
Long Beach:	800 West 16th St. HEMLOCK 2-2911
Los Angeles:	210 Anderson St. ANGELUS 3-7282
Oakland:	1911 Union St. GLENCOURT 1-5451
Oceanside:	805 N. Tremont St. SARATOGA 2-2141
Sacramento:	1900 – 14th St. GILBERT 2-8976
San Bernardino:	655 South "H" St. TURNER 9-1051
San Diego:	720 State St. BELMONT 3-1361
San Jose:	1376 N. Tenth St.
San Francisco:	1750 Alameda St. MARKET 1-5131
Santa Ana:	301 French St. KIMBERLY 3-8309
Van Nuys:	15520 Cabrito Road STATE 2-9600

COLORADO

Colorado Springs:	630 West Vermijo Ave. MELROSE 4-3701
Denver:	104 Wazee Market TABOR 5-7111

IDAHO

Boise:	1325 Idaho St. BOISE 2-4501

MONTANA

Butte:	604 E. Aluminum St. BUTTE 3233

OREGON

Eugene:	2580 West Broadway DIAMOND 4-2224
Portland:	Park & Flanders Sts. CAPITOL 7-6641

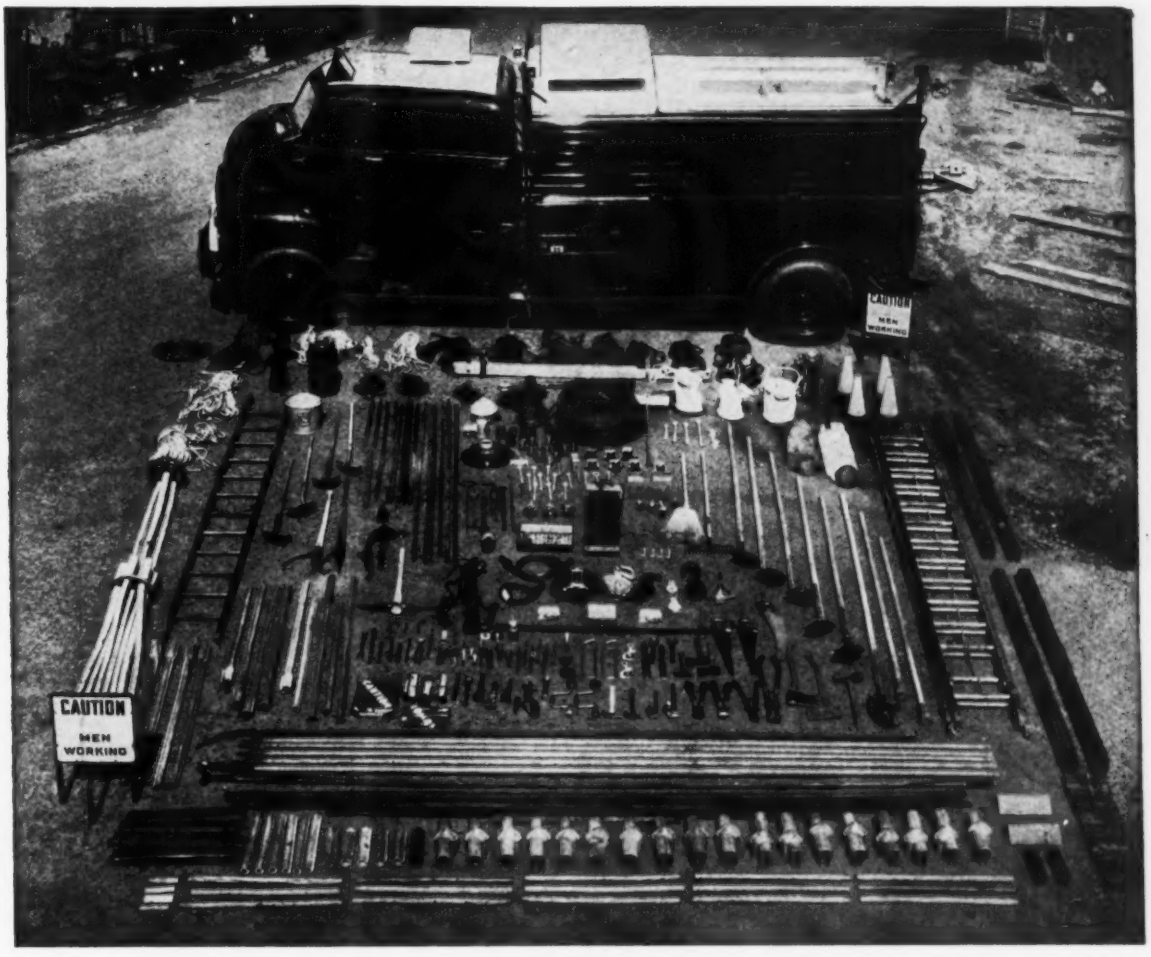
UTAH

Salt Lake City:	336 North Third West St. ELGIN 9-8771

WASHINGTON

Seattle:	King & Occidental Sts. MUTUAL 2-0123
Spokane:	West 1033 Gardner Ave. FAIRFAX 7-6611
Tacoma:	2112 "A" St. MARKET 0164

FOR IMMEDIATE SERVICE ON EVERYTHING ELECTRICAL CALL THE OFFICE NEAREST YOU



Look at your line truck equipment needs from this angle...

Here's a poles-eye view of a typical utility line truck showing the wide variety of construction and maintenance tools and safety equipment your linesmen need for most day-to-day jobs. But—without exception—each and every item shown can be ordered conveniently from your nearby Graybar office or warehouse...and in every case you get the type and quality needed to assure speed and efficiency on the job *plus* long years of satisfactory service. All are products your linesmen know and respect—products that have been tried, tested and proven in the field by scores of companies just like your own.

Remember, when you order "via Graybar", you save the time and expense of multiple inquiries, for you can select, from this single source, the items best suited to your needs from among the products of over 200 of the nation's leading manufacturers.

Graybar is thoroughly familiar with utility requirements. Further, your nearby Graybar Representative stands ready to help as a convenient source of information on everything needed for pole-line construction and maintenance. And should you be faced with an out-of-the-ordinary problem, call on the experience of a Graybar Outside Construction Specialist for a consultation. We'll welcome your inquiry!

511

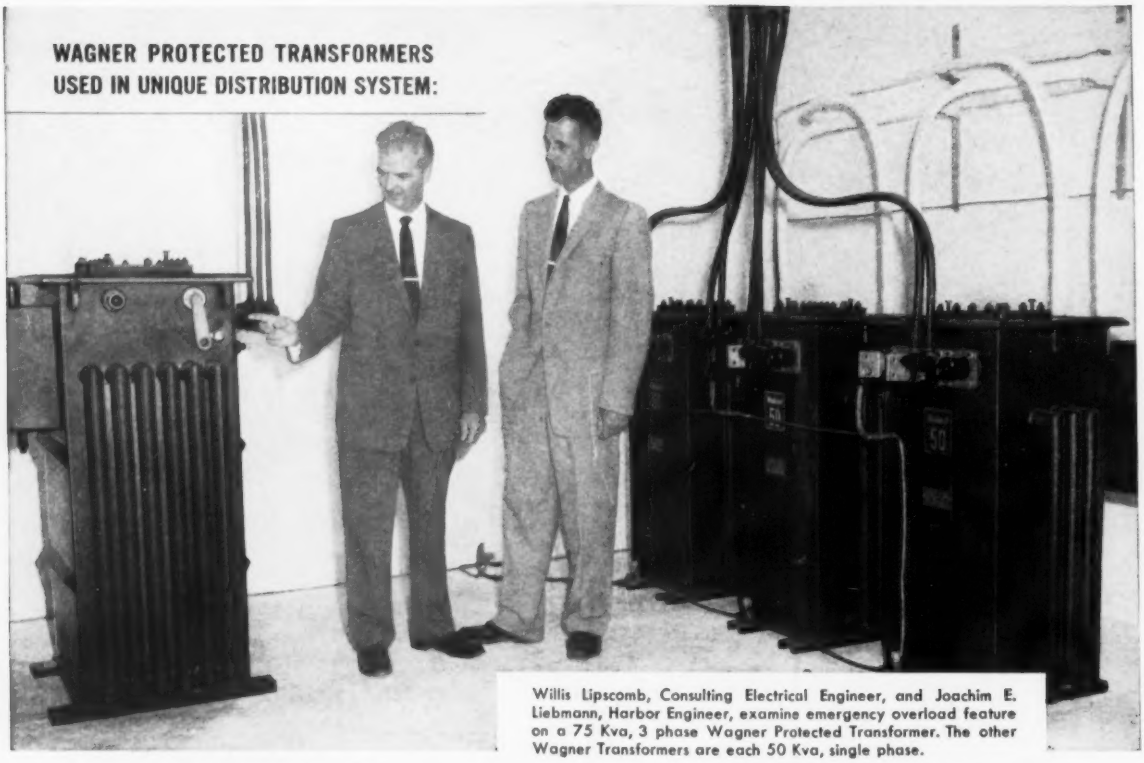
CALL GRAYBAR FIRST FOR...

Everything Electrical

GraybaR ELECTRIC CO., INC.
420 Lexington Ave., New York 17, N. Y.

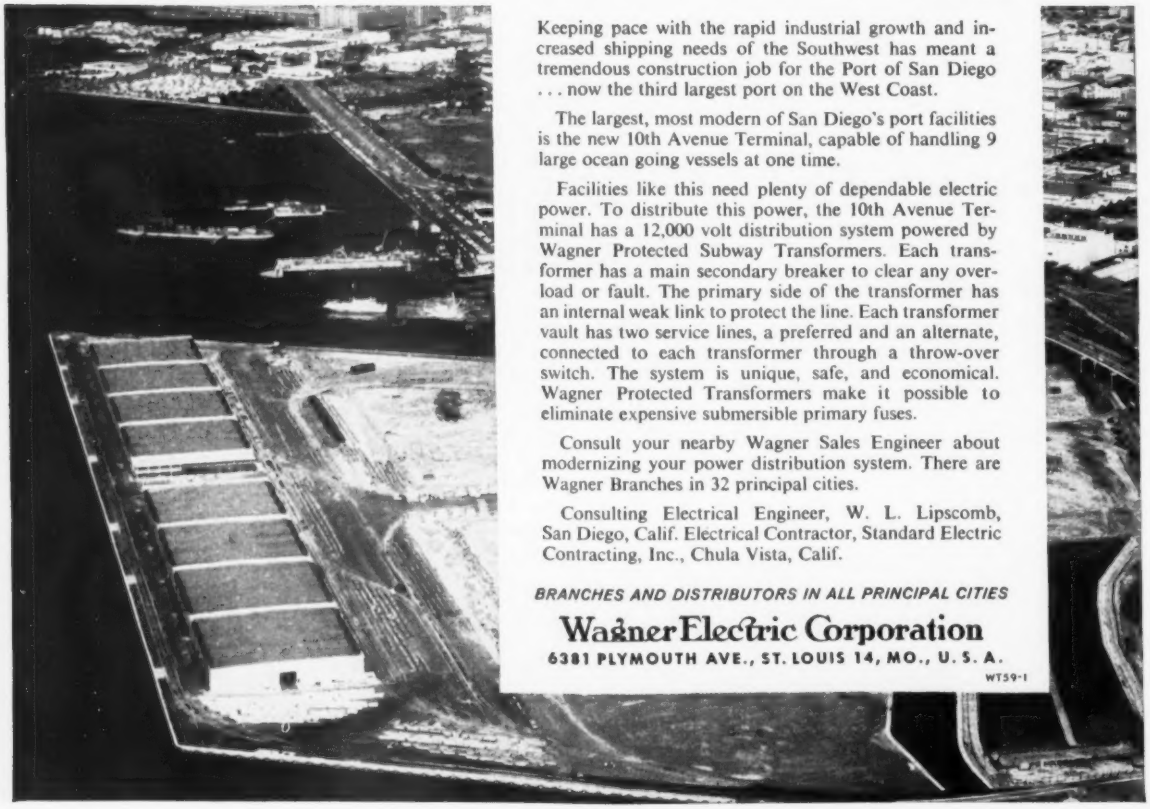
IN OVER 130 PRINCIPAL CITIES

WAGNER PROTECTED TRANSFORMERS USED IN UNIQUE DISTRIBUTION SYSTEM:



Willis Lipscomb, Consulting Electrical Engineer, and Joachim E. Liebmann, Harbor Engineer, examine emergency overload feature on a 75 Kva, 3 phase Wagner Protected Transformer. The other Wagner Transformers are each 50 Kva, single phase.

POWER for the Port of San Diego



Keeping pace with the rapid industrial growth and increased shipping needs of the Southwest has meant a tremendous construction job for the Port of San Diego . . . now the third largest port on the West Coast.

The largest, most modern of San Diego's port facilities is the new 10th Avenue Terminal, capable of handling 9 large ocean going vessels at one time.

Facilities like this need plenty of dependable electric power. To distribute this power, the 10th Avenue Terminal has a 12,000 volt distribution system powered by Wagner Protected Subway Transformers. Each transformer has a main secondary breaker to clear any overload or fault. The primary side of the transformer has an internal weak link to protect the line. Each transformer vault has two service lines, a preferred and an alternate, connected to each transformer through a throw-over switch. The system is unique, safe, and economical. Wagner Protected Transformers make it possible to eliminate expensive submersible primary fuses.

Consult your nearby Wagner Sales Engineer about modernizing your power distribution system. There are Wagner Branches in 32 principal cities.

Consulting Electrical Engineer, W. L. Lipscomb, San Diego, Calif. Electrical Contractor, Standard Electric Contracting, Inc., Chula Vista, Calif.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation

6381 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.

WT59-1

For phone number of closest representative see advertising index in back of book.

All have costs of more than $300 per pupil compared with Arkansas which spends only $156 annually per pupil. These figures take no account of capital expenditures.

—EW—

John C. Virden Jr. has been elected president of the American Home Lighting Institute for 1959. He is president of John C. Virden Co., Cleveland.

—EW—

LIVE LONGER, ELECTRICALLY—Successful development of an electrical device for use in treating interruptions of normal heart rhythm during surgical operations has been announced by J. E. Corette, president of Edison Electric Institute.

Known as a closed-chest defibrillator, the new device restores normal heart rhythm by means of electric currents sent through the heart from electrodes placed on the surface of the chest.

Corette said: "The development of a reliable and effective closed-chest defibrillator has been a result of research carried on at Johns Hopkins University under a grant from the Edison Electric Institute.

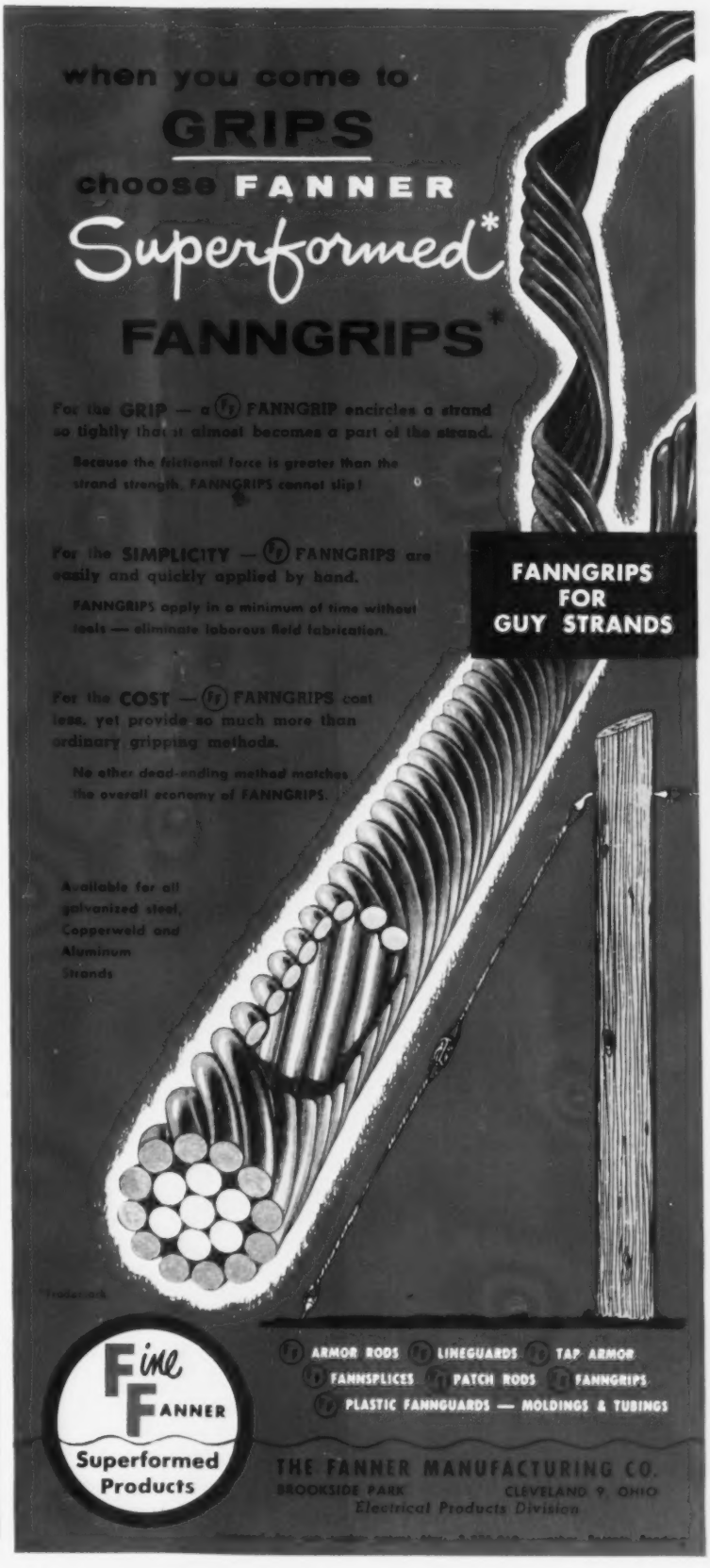
—EW—

Precision Transformer Corp. of Chicago was able to ship 100 dry-type transformers just 10 days after a disastrous fire had destroyed the coil winding and assembly lines. Production is back to normal as you are reading this. The fire started in a building in back of the Precision plant, spread to the company's property and raged out of control.

—EW—

COUNTERATTACK—*Look* magazine featured the far-reaching contributions made by the electrical industry in the third of a series of messages defining the role of American business to Americans.

Headlined "The Russians are trying to turn our best weapon against us," the electrical industry is praised for what it has done to make the comforts and conveniences of life widely available. The message also reports that despite the constant increase in the invested capital, there are more small electrical suppliers today than there were 10 years ago.


when you come to
GRIPS
choose FANNER
Superformed*
FANNGRIPS*
For the GRIP — a FANNGRIP encircles a strand so tightly that it almost becomes a part of the strand.
Because the frictional force is greater than the strand strength, FANNGRIPS cannot slip!
For the SIMPLICITY — FANNGRIPS are easily and quickly applied by hand.
FANNGRIPS apply in a minimum of time without tools — eliminate laborous field fabrication.
For the COST — FANNGRIPS cost less, yet provide so much more than ordinary gripping methods.
No other dead-ending method matches the overall economy of FANNGRIPS.
Available for all galvanized steel, Copperweld and Aluminum Strands
FANNGRIPS FOR GUY STRANDS
*Trademark
Fine FANNER Superformed Products
ARMOR RODS LINEGUARDS TAP ARMOR
FANNSPLICES PATCH RODS FANNGRIPS
PLASTIC FANNGUARDS — MOLDINGS & TUBINGS
THE FANNER MANUFACTURING CO.
BROOKSIDE PARK CLEVELAND 9, OHIO
Electrical Products Division

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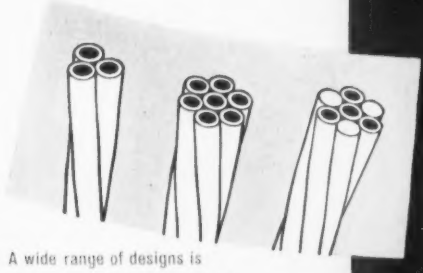
NOW . . . a NEW



A wide range of designs is
both useful and economical

overhead ground wire

ALUMOWELD™

Aluminum-Covered Steel Wire

Exclusive features—

a **thick cladding** of aluminum
a controlled **atomic weld**

Give your transmission lines positive and permanent protection with the new light-weight, low-cost Alumoweld Overhead Ground Wire. It's the only aluminum-covered steel wire with a thick cladding of aluminum and the only one made by the controlled atomic-weld process.

Not only does Alumoweld have the strength of steel wire, but because of its 25% by area aluminum covering, it offers the added advantages of much higher conductivity and far greater service life. In fact, Alumoweld has corrosion resistance equal to solid aluminum wire, has one third the conductance, and eight times the strength. Just about optimum values for an Overhead Ground Wire!

In Alumoweld Overhead Ground Wire, you get three important benefits. (1) Its thick aluminum covering permanently protects the high-strength steel core against corrosion. (2) The electrical conductance is excellent for relaying and for discharging lightning and transient currents to ground. And, (3) Alumoweld's high strength permits stringing for ample mid-span clearance. Together, these add up to long-life protection and reduced service interruptions for your transmission lines.

For more information, write today for Engineering Bulletin E.D.3000.

ALUMOWELD

PRODUCT OF COPPERWELD STEEL COMPANY, WIRE AND CABLE DIVISION, GLASSPORT, PA.

For Export, COPPERWELD STEEL INTERNATIONAL COMPANY, New York

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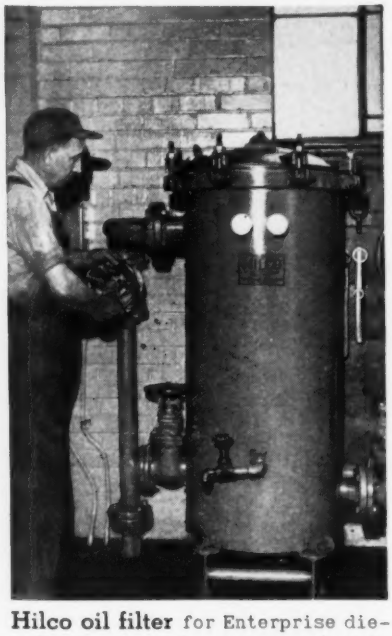
STANDARD ENGINEER'S FIELD REPORT

PRODUCT **RPM DELO OIL**

FIRM **ELKO LAMOILLE POWER CO.**
Elko, Nevada

RPM DELO Oil holds wear to .003″ in 9,791 hrs.

In initial operation, this 2,045-hp Enterprise diesel lubricated with RPM DELO Oil ran continuously for 9,791 hours. Average wear on engine's eight 17" diameter cylinders was just .003"! Plant Manager Hugh Liparelli says, "Frankly, the clean condition of the pistons and liners surprised me. I expected them to be coated with varnish, but instead we found them bright and shiny. The engine looked as if it had only run about 2,000 hours. There were no stuck rings, no engine deposits of any kind." The engine drives a 1450 KW generator at Elko Lamoille Power, went into service in 1954.



Hilco oil filter for Enterprise diesel operates whenever engine is running, helps keep oil clean, permits longer continuous operation. RPM DELO Oil, the only lubricant used in this engine, is also used in cylinder lubricators of station's five other diesels. Elko Lamoille Power Co. has used RPM DELO OIL since its introduction.

Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrosion of bearing metals
- Inhibitor resists crankcase foaming.

For More Information on this or any other petroleum product contact your Standard Engineer or representative, or write 225 Bush Street, San Francisco 20, California.

LUBRICATING OILS RPM DELO

TRADEMARKS "RPM DELO" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA

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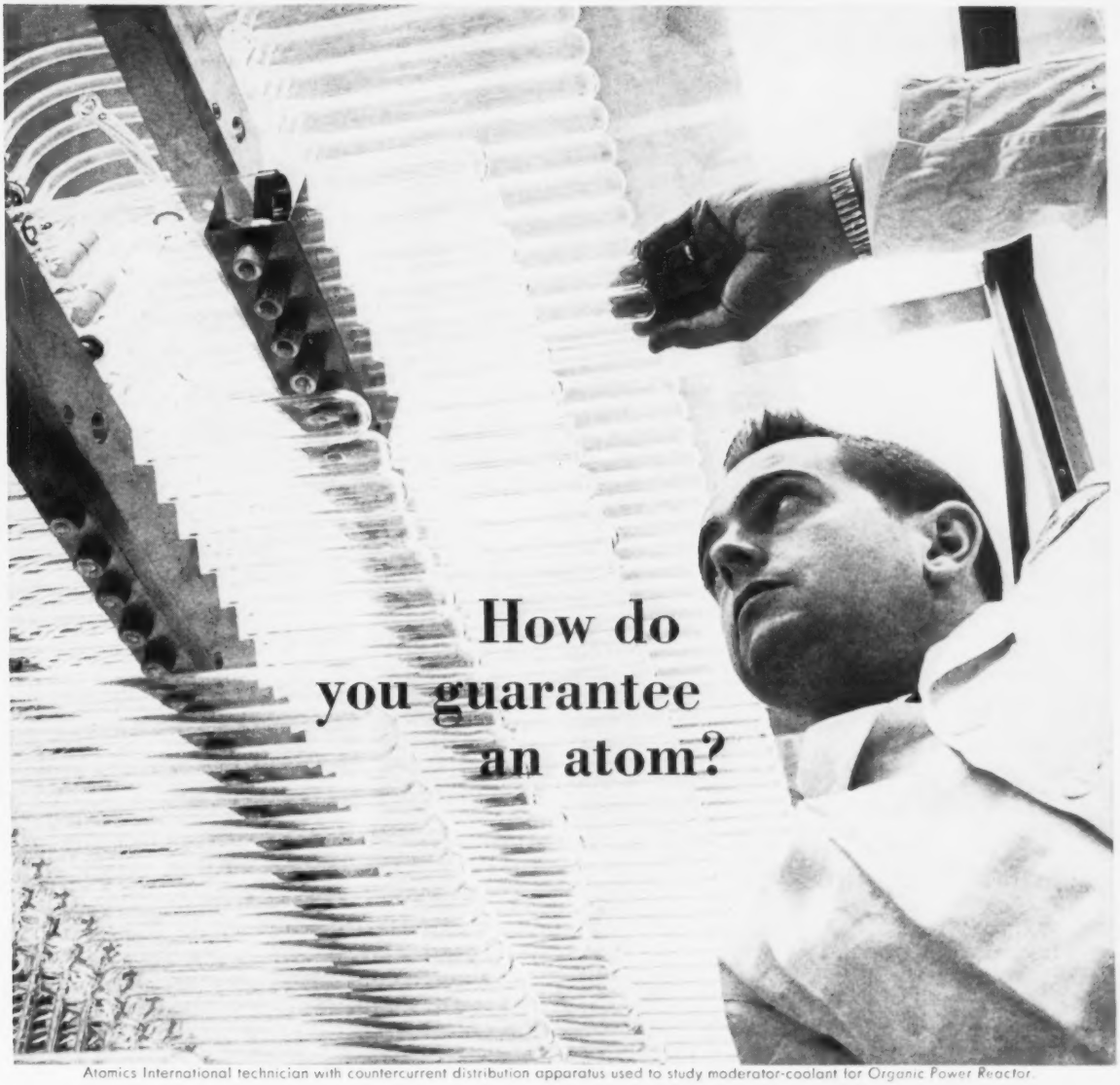


Atomics International technician with countercurrent distribution apparatus used to study moderator-coolant for *Organic Power Reactor*.

Begin with the knowledge of experienced scientists... conduct a seven-year research and development program ...collect a wealth of solid operating experience. Result: GUARANTEED PERFORMANCE of a nuclear power reactor, designed by Atomics International to help meet the world's power needs.

This is the ORGANIC POWER REACTOR—outgrowth of research and development on the organic system and operation of the Organic Moderated Reactor Experiment (OMRE) conducted by Atomics International for the U.S. Atomic Energy Commission.

Outstanding advantages of the ORGANIC POWER REACTOR: Low capital investment • Low cost operation • High inherent safety and flexibility • Reliability resulting from

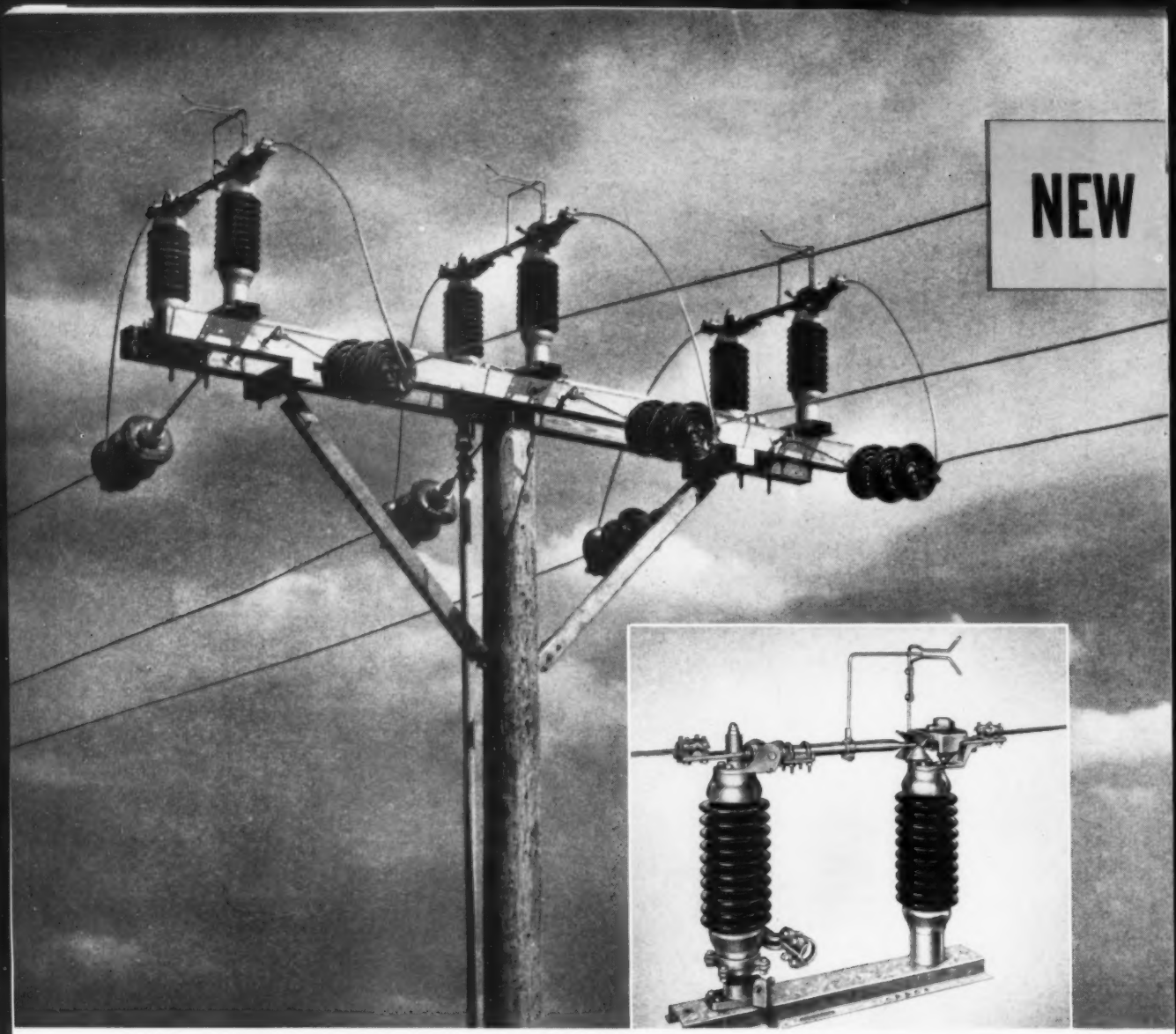
- **Non-corrosive moderator coolant**
- **Low pressure system**
- **Conventional, off-the-shelf components and materials**
- **Easy access during operation**

Atomics International is ready to furnish complete ORGANIC REACTOR electric power plants, including fuel elements, in a wide range of power levels. An experienced field staff will assist with initial plant operation, personnel training and maintenance procedures.

For details contact: ATOMICS INTERNATIONAL, Canoga Park, California, U.S.A. Cable address: ATOMICS.

ATOMICS INTERNATIONAL
A DIVISION OF NORTH AMERICAN AVIATION, INC.
PIONEERS IN THE CREATIVE USE OF THE ATOM

Other offices in: Washington, D.C., U.S.A.; Geneva, Switzerland. Affiliated with: INTERATOM, Bensberg/Cologne, Federal Republic of Germany



NO OTHER SIDE-BREAK DISCONNECT GIVES YOU ALL OF THESE OPERATING ADVANTAGES

- **Correct contact always maintained at blade tip even if crossarm warpage distorts the switch base.**
- **All blades engage fully in the break-contact jaws without precise adjustment of the inter-phase rods.**
- **Less time and labor to install with Kearney original wide-tolerance mechanical design.**
- **Easiest, surest ice-breaking ability available on both opening and closing.**

This newest Kearney development solves long-existing operating problems of crossarm mounted group operated side-break disconnects. The best supporting structure or crossarm construction may . . . due to ice loads, age, wind or line strain . . . deflect enough to distort the switch bases, or alter the relative positions of the three phases. This often causes loss of contact or failure of all blades to close completely in conventional disconnects with both rigid blades and stationary break-contacts.

Kearney's advanced design features a self-aligning blade constructed to permit controlled vertical movement and axial rotation. This automatically compensates for base distortion . . . keeps the blade tip correctly aligned in the contacts. The break-contact swings 30-degrees with the blade as it is opened or closed, producing high leverage ice-breaking ability and full wiping of the silver current transfer surfaces. On closing, the blade tip fully engages the break-contact before the contact moves from its angular open position, compensating for any shift in position of the switch bases. This same feature also allows considerable freedom in interphase rod adjustment, enabling Kearney ***Self-Aligning*** side-break switches to be installed faster and more economically than other types.

The details of these original features for maintenance-and-adjustment-free operation are shown on the facing page.

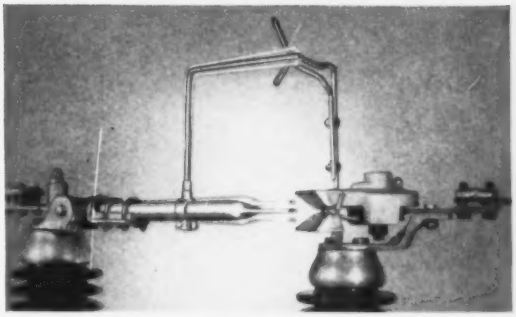
For phone number of closest representative see advertising index in back of book.

Kearney's

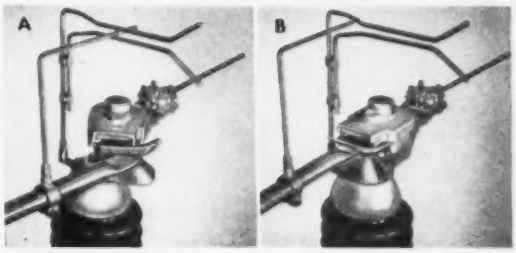
Self-Aligning SIDE-BREAK DISCONNECTS

...always make positive contact, even if the supporting structure warps, twists, bows or settles.

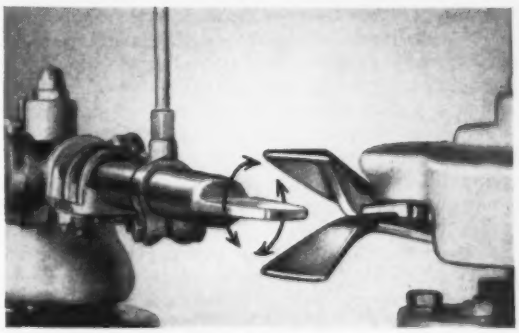
Self-aligning blade moves in a vertical plane to re-establish the original relationship between blade tip and contacts if supporting structure warpage distorts switch base. Wide mouth contact jaws assure blade entry into the contacts. Vertical 1¼" movement more than corrects for extreme cases of misalignment.



Break-contact swings 30° in the plane of blade travel as switch is opened or closed, providing highest leverage ice-breaking and full wiping of the current transfer surfaces. Note that the blade tip is fully engaged, and full contact is maintained (A) through the final 20° of blade travel to the fully closed position shown at (B). This feature allows more latitude in phase rod adjustment than other designs.



Blade rotates 12° on its longitudinal axis. If base distortion has affected blade-contact alignment, the blade tip will rotate as it enters the break-contact to keep all contact surfaces parallel, automatically restoring contact alignment. Friction reducing construction at all rotation points minimizes operating effort.



Switch carries full-rated load current well within NEMA temperature rise, from a fully closed position to 20° partially open position. Ratings available, 7.5 through 69 kv, 600 amperes. Equipped with conventional or whip-type arcing horns... torsional or spade-type operating mechanism. May be mounted horizontally, vertically, or underhung.

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue, St. Louis 10, Missouri

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, **Maydwell and Hartzell, Inc.,**
Los Angeles • Seattle • Portland • San Francisco • Spokane • Phoenix.

397

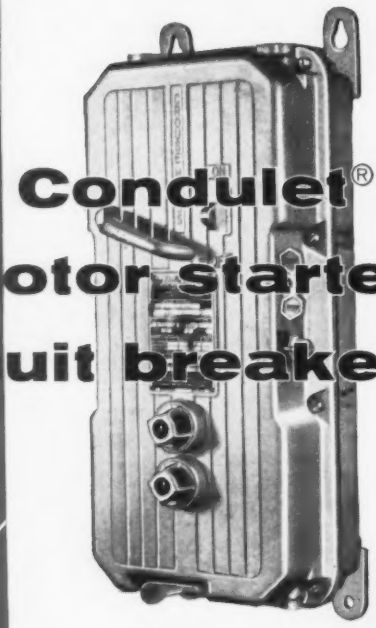
FOR BETTER CONSTRUCTION... SAFER MAINTENANCE

Specify Kearney Products

Plants at: **ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH & CLARINDA, IOWA • GUELPH, ONTARIO, CANADA**

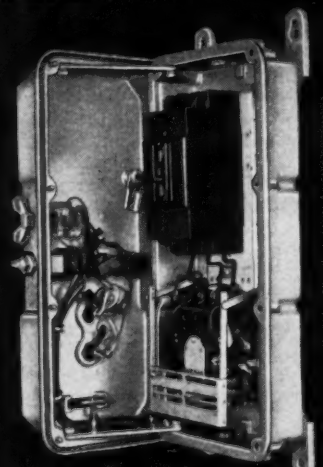
For phone number of closest representative see advertising index in back of book.

NOW a single Condulet® for any make motor starter and circuit breaker!



★TYPE DMC: Dust-Ignition-Proof (Dust-Tight) — National Electrical Code Class II, Groups E, F and G; NEMA Type 9EFG.

★★TYPE WMC: Watertight — NEMA Types 3, 3R, 4 and 5.



UNIQUE COVER HINGING ARRANGEMENT allows DMC-WMC Condulets to be mounted directly adjacent to other Condulets without providing extra space between for cover to hinge open. Cover pulls out, then to either side to clear adjacently-mounted Condulets or other equipment.

CROUSE-HINDS TYPES DMC* AND WMC** Combination Line Starter CONDULETS

DMC-WMC Condulets are designed to accept and operate any of the various makes of motor starters and circuit breakers. Single speed non-reversing combinations are equipped with a universal mounting plate, motor starter reset assembly and circuit breaker operating assembly. No substitutions of any parts on the Condulets are required.

Built-in push-button stations and selector switches with various contact arrangements, pilot lights and control transformers can be supplied. Push-button and selector-switch operating shaft holes and pilot-light holes may be drilled, tapped and plugged for future use.

Separate mounting lugs are bolted on body. A center position is provided on back of body so that lugs can be attached for 3 point suspension or center pole (2 point) mounting. Circuit breaker handle has provision for padlocking in "On" or "Off" position.

WRITE for descriptive literature and specifications . . . or contact your Crouse-Hinds distributor.

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK

Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

Crouse-Hinds Instrument Company, Inc., Silver Spring, Maryland

● CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) ● FLOODLIGHTING ● TRAFFIC CONTROL SYSTEMS ● AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Atlanta Baton Rouge Birmingham Boston Buffalo Charlotte Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. St. Louis St. Paul Salt Lake City San Francisco Seattle Tulsa Washington

Resident Representatives: Albany Baltimore Reading, Pa. Richmond, Va.

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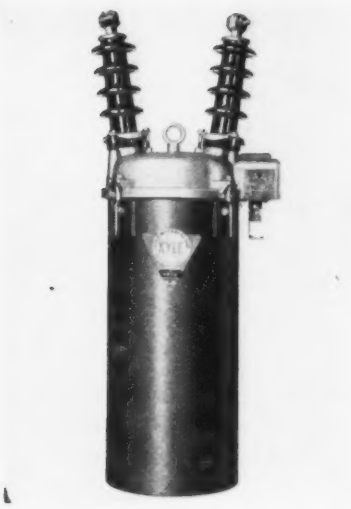
PRODUCT NEWS

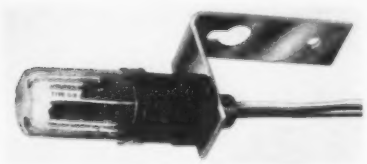
New Designs and Applications



Single-Phase Recloser

(1) *Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.*

An improved 150-kv BIL single-phase recloser with increased interrupting ratings is now available from this company. It is intended for use on distribution circuits having phase-to-phase voltages of 2.4 to 23 kv, fault currents up to 2,500 symmetrical amperes, and load currents ranging from 5 to 100 amp. Three reclosers can be electrically interlocked to provide three-phase lockout when any recloser locks open. Features are a new arc-interrupter mechanism and a hydraulic system that allows greater choice of operating sequences.



Lighting Control

(2) *Precision Magnetic Controls Inc., Ridgewood, N. J.*

A compact photoelectric control for outdoor lighting that operates 240-v systems at 7 amp and handles up to 1,500-w load is available from this company. The control consists of only two components, which are a light sensitive cadmium sulphate photocell and a single throw integrating relay. It is said to be especially adaptable to the operation of higher voltage equipment, such as floodlighting, auxiliary power, etc. No directional orientation is necessary.

Airbreak Switch

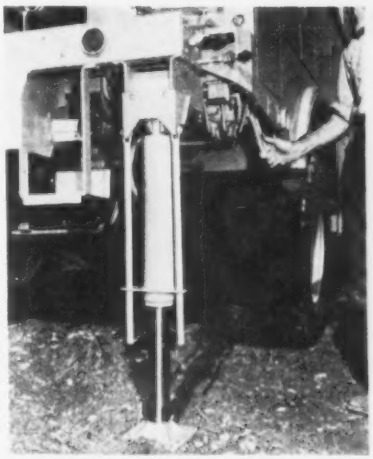
(3) *Turner Electric Co., 9510 St. Clair Ave., East St. Louis, Ill.*

High speed dual arcing horns capable of interrupting charging currents on 100 miles of 69-kv line are features of this new switch. It is mounted on two insulators, and is available in 600- and 1,200-amp sizes from 15 through 161 kv. All switch blade disconnecting points have high pressure beryllium contacts.

Frequency Recorder

(4) *General Electric Co., Schenectady 5, N. Y.*

A new, narrow-range frequency recorder, said to be capable of meeting utility requirements for high accuracy measurement in the 58- to 62-cycle band, is announced by this company. The instrument features accuracy of plus or minus .05 cycle, and is completely self-contained for economical mounting and wiring. Available for semiflush or surface panel mounting or as a portable instrument.



Self-Stowing Jack

(5) *Holan Corp., 4100 W. 150th St., Cleveland 35, Ohio*

A new self-stowing hydraulic jack offered by this company swings down and reaches maximum extension in eight seconds. The jacks can be used for stabilizing parked trucks using power equipment, for spotting diggers and for changing tires. Capacity is 14,000 lb, maximum extension 40 in. from top to base plate, and it is 25 in. long when stowed. Power is supplied from existing hydraulic systems on the trucks or from a separate circuit installed with the jacks. Working pressure is up to 1,200 psi.

Safety Strap

(6) *Miller Equipment Co. Inc., Franklin, Pa.*

A new safety strap made of 100% 1¾-in. yellow neoprene nylon, with a two-ply red safety center, is announced by this company. Single tongue buckle construction is a feature. Buckle hole strength is said to test 2,100 lb straight snap to snap pull.

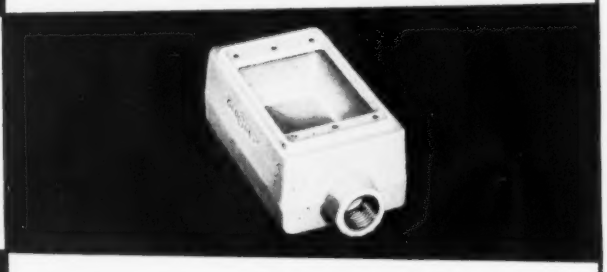
Cut costs... without cutting corners! Specify... GEDNEY CONDUIT BODIES

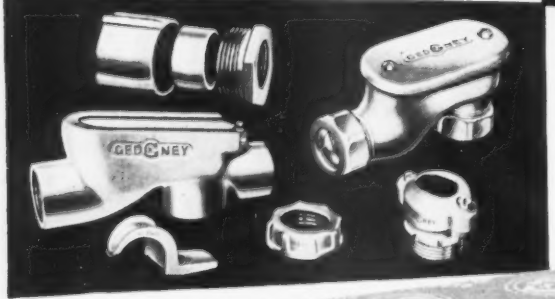
Gedney Conduit Bodies mean lowest installed cost! That's because they are skillfully made of tough, *malleable* iron, then hot-dip galvanized, and finally, they must pass the toughest inspection. Accurate machining and threading assure easiest installation . . . ruggedness assures longest service life!

THE GEDNEY CONDUIT BODY LINE INCLUDES ALL TYPES—SIZES ½" TO 4"

TYPE LB—Threaded—for heavy-wall rigid conduit. Use them with Gedney entrance fittings, straps, clamp backs to get an *entire* conduit system that is hot-dip galvanized.

TYPE FS—Threaded—shallow bodies for heavy-wall rigid conduit. Hot-dip galvanized finish prevents corrosive deposits—means easier installation, longer life.





SCORES OF OTHER GEDNEY FITTINGS are available for every purpose—all carefully designed, manufactured and inspected to assure economical installation and maximum customer satisfaction.

GEDNEY FITTINGS FIT

GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG., RADIO CITY, NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

For phone number of closest representative see advertising index in back of book.

Meter Tester

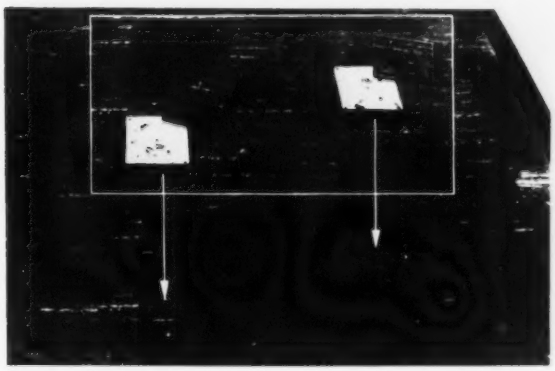
(7) *Knopp Inc., 1307 66th St., Oakland 8, Calif.*

This new watt-hour meter testing equipment provides new current test ranges of 30 and 3 amp for testing modern 30-amp extended range meters. The new model adds the potential test ranges of 208 and 277 v.

Single-Case Ballast

(8) *General Electric Co., Schenectady 5, N. Y.*

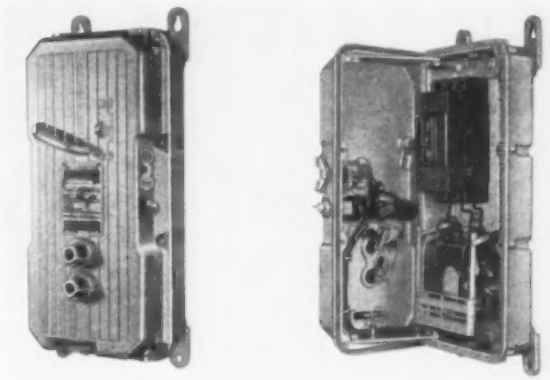
A new ballast for PG, VHO and SHO fluorescent lighting in commercial and industrial applications offered by this company is said to be cooler, quieter and nearly 7 lb lighter than present two-section models. The new single-case ballast is for 120-v operation of two 72- or 96-in. power groove VHO or SHO lamps. It has an 18⅝-in. mounting dimension, and eliminates the need for mounting and interconnecting two separate sections. The company says the case temperature is below 90 C when operated in a typical two-lamp, surface-mounted industrial fixture without the use of auxiliary heat dissipators.



Square Floor Pans

(9) *National Supply Co., 2 Gateway Center, Pittsburgh 22, Pa.*

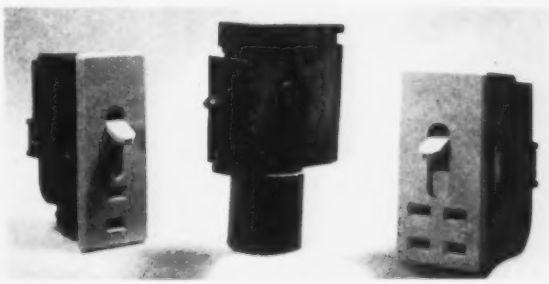
Tile floor coverings into access boxes of Spang underfloor raceway systems have been made less conspicuous with redesigned square floor pans, now available. Rim thickness has been reduced to 1/16 in. and the pan is held by a single center screw instead of four corner screws.



Condulets

(10) *Crouse-Hinds Co., Wolf & 7th N. Sts., Syracuse 1, N. Y.*

Two new combination line starter condulet enclosures, one dust-ignitionproof and another watertight, are offered by this company. They are designed to accept and operate any of the various makes of motor starters and circuit breakers, the company reports. Built-in push button stations and selector switches with various contact arrangements, pilot lights and control transformers can be supplied. Design of the cover allows the condulets to be mounted directly adjacent to others without providing extra space between for the cover to hinge open.



Circuit Breakers

(11) *Federal Pacific Electric Co., 50 Paris St., Newark 1, N. J.*

A new line of low amperage circuit breakers for a wide range of special electrical machine and appliance applications has been introduced by this manufacturer. The units were developed to meet a demand for small, rugged, switch-rated breakers to be used in conjunction with motors, appliances, electronic apparatus, and OEM and other industrial equipment. They are rated 5 through 20 amp.

Bulletins and coupon are on p 32

KLEIN

THE THRILL THAT ONLY GOOD TOOLS CAN GIVE

"Since 1857"

It's a pleasure to use good tools—pliers that grip tight . . . that cut through tough wire easily . . . that reach confined spaces.

Linemen and electricians know that they can rely on their Kleins—side cutters, long nose, oblique cutters—famous for quality for a century.

There is a Klein Plier exactly suited to every electrical need—carried in stock by better electrical suppliers everywhere.

Write for your FREE copy of the Klein Pocket Tool Guide listing Klein equipment and giving valuable information.

Mathias Established 1857 KLEIN & Sons Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

Transformers

(12) *Precision Transformer Corp., 2218 W. Lake St., Chicago 12, Ill.*

A new line of liquid-filled transformers offered by this company consists of both oil and askarel immersed types for distribution and power uses. Capacities range from 10 kva up to 5,000 kva at 69 kv. High and low voltage bushing terminals accommodate either copper or aluminum line leads.

Long-Nose Plier

(13) *Mathias Klein & Sons, 7200 McCormick Rd., Chicago 45, Ill.*

This new long-nose plier is designed to reach into confined places. An exceptionally slender design makes this possible. Length is 8 in.

Operating Mechanism

(14) *Kelman Electric & Mfg. Co., 1667 N. Main St., Los Angeles, Calif.*

Production is under way now on a new spring electric operating mechanism designed for application to this company's distribution class circuit breakers. Designated type SE-30, the unit is electrically and mechanically trip-free in any position, and is said to meet all ASA and NEMA requirements. Features include a four-bar latch system, and a design that prevents closing unless the closing springs are fully charged. The mechanism is also designed for reclosing relays. Interrupting ratings are 50, 100 and 250 mva.

Guy Protector

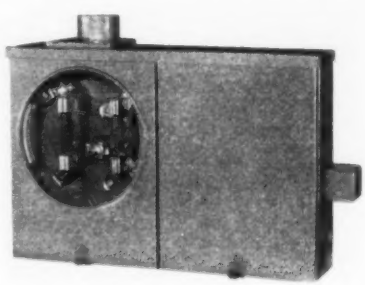
(15) *Hubbard & Co., 200 S. Michigan Ave., Chicago 4, Ill.*

A simple spring clip at the top and a single bolt at the bottom permit fast installation of a new guy protector available from this manufacturer. The tapered protector is made of 18-gage galvanized steel. Edges are turned and rounded, eliminating the hazard of sharp corners exposed to pedestrian contact.

Tag Protector

(16) *Bedford Products Inc., Box 36, Roanoke, Va.*

A clear plastic tag protector offered by this company permits the use of paper tags on transformers, terminals, disconnect switches, etc. Protectors are available in three sizes.



Meter Socket—Capacitor

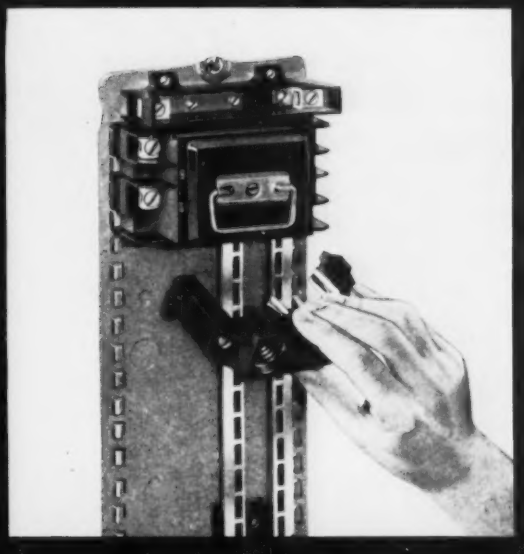
(17) *Sangamo Electric Co., Springfield, Ill.*

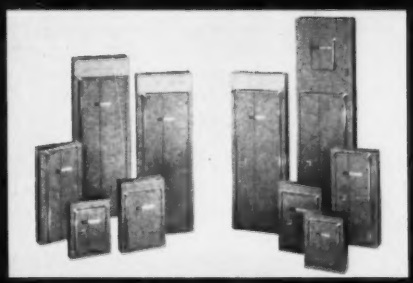
This manufacturer announces the availability of a new service entrance

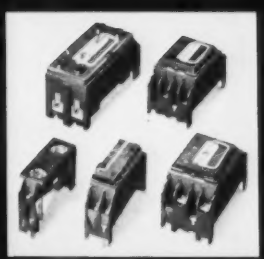
For phone number of closest representative see advertising index in back of book.

Another Engineering Achievement

BIG NEWS!
ALL-NEW STAB-IN
fusible service equipment







10 enclosures...5 stab-in units replace 208 devices...meet all requirements through 200 amps!

For the first time! Uncompromised flexibility—because there are no fixed circuits. Now you can tailor every installation to your exact requirements. Just stab-in circuits where you want them—when you want them! CHECK THESE FEATURES...

ENCLOSURES

- ✔ Only 10 enclosures: 5 split bus, 5 parallel.
- ✔ Dual rated for service entrance and load center applications.
- ✔ Exclusive "picture frame" combination flush/surface feature.
- ✔ Exclusive sequence bussing.
- ✔ Step-type insulated neutrals.
- ✔ Narrow width—shallow depth.
- ✔ UL approved for both copper and aluminum cable.

STAB-IN UNITS

- ✔ Only 5 stab-in units: 30 amp Twin Plug-Fuse Unit, 30 amp Cartridge-fuse Pullout, 60 amp Main Cartridge-fuse Pullout, 60 amp Branch Cartridge-fuse Pullout, 100 amp Cartridge-fuse Pullout.
- ✔ Exclusive "millions-tested" four-way stabs.
- ✔ Unique locking clip insures non-interchangeability. Defeatable by qualified contractor.
- ✔ Compact new space-saving 30 and 100 amp pullout units.

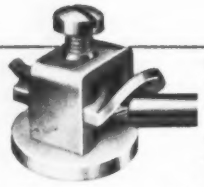
Now you can afford to carry your own stock and meet all your fusible requirements through 200 amps. Get the proof! Write for Bulletin 1-215, Federal Pacific Electric Company, General Offices: Dept. 322, Newark 1, New Jersey.

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

The Best in Electrical Distribution and Control Equipment

For phone number of closest representative see advertising index in back of book.

NOW... WIRE RANGES and DRYERS *Faster*



Heavy duty screw staked to clamping pad for quick, positive action of the pad either up or down —

Shipped with screws backed out, ready for instant wiring; just insert the conductor and tighten the screw!

EASIER, FASTER, SAFER WIRING!

Surface Mounting	Flush Mounting
Black or Ivory	Brown or Ivory
RANGE: Cat. No. 606 50 Amp-250V	RANGE: Cat. No. 610 50 Amp-250V
DRYER: Cat. No. 607 30 Amp-250V	DRYER: Cat. No. 611 30 Amp-250V
Unit Pack: 1	Unit Pack: 1
Ship. Carton: 10	Ship. Carton: 10

Deluxe Chrome Wall Plates
Cat. No. 316 grounding
Cat. No. 317 non-grounding
Fit standard 2-gang boxes
in individual envelopes, 10 to a carton, 50 to a shipping carton

You save time and trouble on every installation when you use Royal Range and Dryer Receptacles with the exclusive "Vise-Grip" terminals. "Vise-Grip" assures positive connections every time . . . for FULL, NO-ARC power to the appliance.

No receptacles can "out-feature" Royal — with heavy duty, double-wipe spring contacts, sturdy phenolic body, and self-finding slots. Want details? Ask your wholesaler, or write for catalog, giving wholesaler's name.

ROYAL ELECTRIC CORPORATION
PAWTUCKET, RHODE ISLAND

ROYAL ELECTRIC ...an associate of

SALES REPRESENTATIVES AND WAREHOUSES: Los Angeles—1950 Naomi Avenue, RI 7-9655; **San Francisco**—1225 Sixth St., HE 1-5792; **Seattle**—4130 First Ave., So., MA 3-8882; **Denver**—888 S. Lipan Street, WE 6-3456

type secondary power factor correction capacitor—meter socket combination. The unit has a meter socket with either one or two 1-kvar capacitors preassembled in a standard duplex housing. The unit is fused, and can be furnished with a thermostat switch if desired. It is designated type OS.

Dry-Type Transformers

(18) *Hill Transformers Co. Inc., 1030 Washington St., San Carlos, Calif.*

A new dry-type distribution transformer is offered by this manufacturer. Features include smaller sizes and less weight, and also a low level of noise. Rubber insulators isolate the core and coil from direct contact with the transformer case to isolate vibration and reduce noise. The units are available in both single and three phase through 500 kva.

Entrance Fitting

(19) *Appleton Electric Co., 1701 Wellington Ave., Chicago 13, Ill.*

Three sizes of this new snap-on entrance head cover applications on

1¼-, 1½- or 2-in. threaded or nonthreaded, heavy or thinwall conduit. Installation requires only a screwdriver. Except for the plastic insulator, the entire fitting is made of aluminum alloy. The hub slides down on the conduit, coming to rest on a self-centering pipe stop. A set screw is tightened to hold it in position.

New Developments

► Extension of its 600-v low-voltage metal-enclosed switchgear line to accommodate the complete range of secondary unit substations for 480-v service has been announced by **Allis Chalmers.**

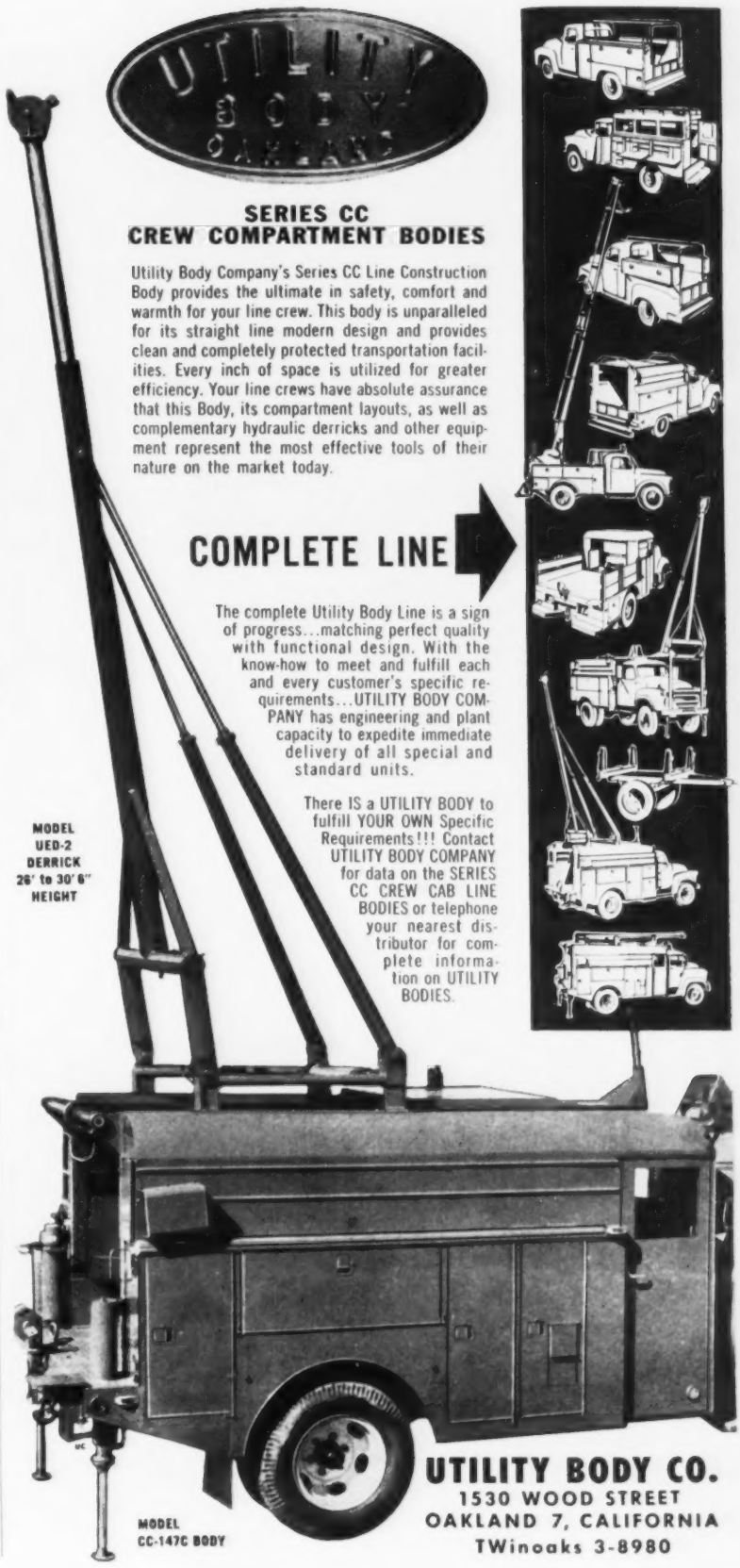
► A flat steel supporting strut between the pipe and round race of **Hubbard & Co.'s** most popular street light bracket provides greater strength. The greater strength makes the street light bracket usable for 400-w mercury vapor luminaires with built-in ballasts.

► An experimental "square" fluorescent lamp has been developed by **General Electric Co.** It gives more light than the conventional 100-w household bulb and consumes half the electricity. It is made by sealing two channeled plates of glass together to form a thin, nearly flat panel about 1 ft sq and 1 in. thick.

► Forced-oil-cooled power transformers made by **General Electric** now have improved coolers. Oil pumps have been moved to a more accessible location at ground level, and the coolers use quieter fans designed to prevent air recirculation.

► Faster unpacking, less handling weight and equal protection are promised by a new type of cable reel packing being introduced by **Reynolds Metals** Co. for reel sizes 48A through 69B. The new packing consists of a wrap of resilient padding and an overwrap of plywood inside the reel flanges. It is secured by metal strapping.

► Aluminum transformer tanks, developed jointly by several electrical manufacturers and aluminum companies, are receiving industry attention. Both Alcoa and Reynolds Metals have assisted with the development. Public announcements of the new products have been made by **Precision Transformer** Corp., **Moloney Electric** Co. and **Westinghouse Electric** Corp.

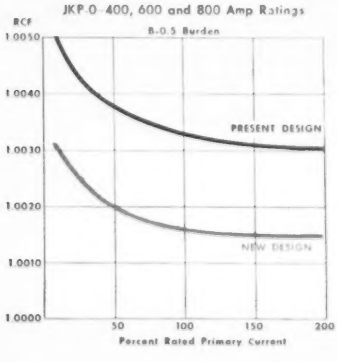

UTILITY
BODY
OAKLAND
SERIES CC
CREW COMPARTMENT BODIES
Utility Body Company's Series CC Line Construction Body provides the ultimate in safety, comfort and warmth for your line crew. This body is unparalleled for its straight line modern design and provides clean and completely protected transportation facilities. Every inch of space is utilized for greater efficiency. Your line crews have absolute assurance that this Body, its compartment layouts, as well as complementary hydraulic derricks and other equipment represent the most effective tools of their nature on the market today.
COMPLETE LINE
The complete Utility Body Line is a sign of progress...matching perfect quality with functional design. With the know-how to meet and fulfill each and every customer's specific requirements...UTILITY BODY COMPANY has engineering and plant capacity to expedite immediate delivery of all special and standard units.
There IS a UTILITY BODY to fulfill YOUR OWN Specific Requirements!!! Contact UTILITY BODY COMPANY for data on the SERIES CC CREW CAB LINE BODIES or telephone your nearest distributor for complete information on UTILITY BODIES.
MODEL UED-2 DERRICK 26' to 30' 6" HEIGHT
MODEL CC-147C BODY
UTILITY BODY CO.
1530 WOOD STREET
OAKLAND 7, CALIFORNIA
TWinoaks 3-8980

—1225 Sixth St., HE 1-5792; **Seattle**—4130 First Ave., So., MA 3-8882; **Denver**—888 S. Lipan Street, WE 8-3456

From General Electric . . .

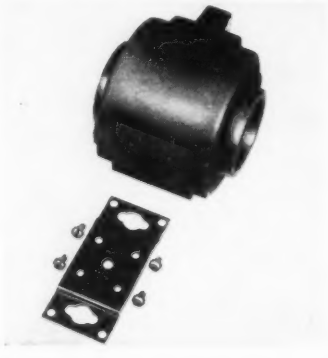
NEW DIMENSIONS in

ADDITIONAL PLUS FEATURES



HIGHER ACCURACY

In pacing industry trends toward better performance at higher loads, G-E engineers have improved JKP-O current transformer accuracy at higher burdens. New models now give 0.3 accuracy at B-0.1, B-0.2, and *B-0.5* in 400:5, 600:5, 800:5 ampere ratings.



MAXIMUM MOUNTING FLEXIBILITY

Removable, stainless-steel base plates, held in place by four screws positioned in a square 1½ inches on center, can be rotated 90 degrees relative to the transformer. Consequently, JCA-O and JKP-O transformers can be individually- or gang-mounted more easily.

For phone number of closest representative see advertising index in back of book.

Current Transformer Design

Now, G-E Current Transformers Provide UP TO 50% MORE USABLE CABLE AREA

COLOR-CODED NAMEPLATES

Stainless-steel nameplates, color-coded to EIA standards (red—200 amps, yellow—400 amps, blue—600 amps, grey—800 amps) permit quick transformer identification. On JKP-O models, key current ratio numbers can be read from a distance of 60 feet.

General Electric's line of job-proven 600-volt indoor-outdoor current transformers has taken on new dimensions. The window diameter on G.E.'s 200-amp JCA-O model has been increased from 1 inch to 1 3/16 inches. The 400-amp model window diameter has been increased from 1 5/16 inches to 1 1/2 inches.

In the General Electric JKP-O current transformer line, window diameters have been increased to 2 3/8 inches on 200-amp models and to 2 3/4 inches on the popular 400:5, 600:5, 800:5 models. These larger ratings will easily accommodate *two* 750 MCM cables or *three* 500 MCM cables. This window diameter increase provides up to 50% more area for cable installation.

In addition, the full circular G-E current transformer window opening permits: 1. easier cable insertion to reduce installation time; 2. better cable self-alignment within the window, thereby reducing the amount of mechanical stress and physical strain exerted on the transformer; 3. faster hook-up in restricted areas where cable must be wrapped in a small box.

Improved Design Provides Higher Accuracy, Greater Mounting Flexibility and Color-coding

In pacing industry trends toward better performance at higher loads, General Electric engineers have improved JKP-O current transformer accuracy at higher burdens. Both JCA-O and JKP-O transformers feature detachable, interchangeable base-plates which facilitate either individual or gang-mounting.

Oversize stainless-steel nameplates, color-coded in conformance with EIA standards, permit fast transformer identification in stock or in service. On JKP-O transformer nameplates, key current ratio numbers are printed large enough to be read at a distance of 60 feet.

G-E Current Transformers Still Offer The Advantages of Butyl-molded Construction

General Electric current transformers are butyl-molded to assure long, low-maintenance service. Mechanically strong, butyl also acts as a tough, resilient moisture and oxidation-resistant insulation.

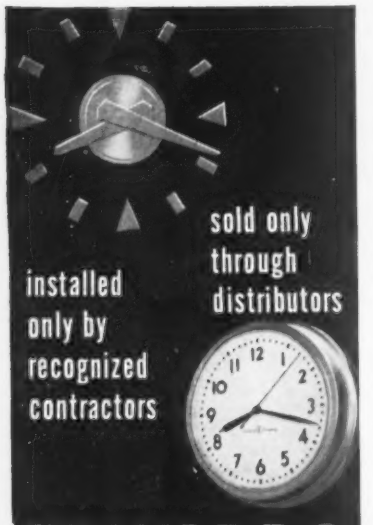
Primary and secondary polarity marks, permanently molded into the butyl casing and painted white, facilitate transformer installation.

Contact Your G-E Apparatus Sales Representative For Complete Ordering Information

Your General Electric apparatus salesman has complete ordering information on the new line of G-E JKP-O and JCA-O current transformers. He's ready to take your order right now! For more information on the new transformer models, write to Section 629-1, General Electric Company, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC



EDWARDS CLOCK SYSTEMS are industry's first choice

- Edward's Clock Systems are designed for simplicity of installation and minimum maintenance.
- Applicable anywhere...15 styles and sizes available, complete with central control for time changes.
- They require no complicated service or periodic inspection.
- They are accurate! Telechron* motors eliminate scattering, coasting, and need for master clocks.
- They are backed by an 87 year reputation and technical assistance.

Why not call your local Edwards technical representative today and see the help he's ready to provide from initial planning stages through checking-out the completed installation. And while you're at it, see how modern Edwards Fire Protection Systems fit your particular needs.

EDWARDS
Specialists in signaling since 1872
CONTROL • COMMUNICATION • PROTECTION
Edwards Company, Inc., Norwalk, Conn.
(In Canada: Edwards of Canada, Ltd, Owen Sound, Ont.)

BULLETINS ETC.

(20) **FLOODLIGHTING** — Catalog 320, published by Crouse-Hinds Co., Syracuse 1, N. Y., is now available. New listings and prices on the complete floodlight line are included along with four new sections.

(21) **POWER GROOVE LAMP**—Information about General Electric's new power groove lamp, which has grooves on both sides of the power groove tube, is now available. Write to the company at Nela Park, Cleveland, Ohio. Ask for Lamp Letter No. 59-79.

(22) **TRANSFORMER COOLING**—Vapor cooling for transformers is discussed in a new eight-page booklet by Westinghouse Electric Corp. For a copy of booklet B-7602 write to the company at Box 2099, Pittsburgh 30, Pa.

(23) **TRANSFORMER CATALOG** — Hill Transformer Co. Inc., 1030 Washington St., San Carlos, Calif., is offering a new 28-page catalog that has complete technical specifications and design and operating data on its dry-type distribution transformers.

(24) **PRICE SCHEDULE** — Kaiser Aluminum & Chemical Sales Inc., 919 N. Michigan Ave., Chicago 11, Ill., announces the availability of a price schedule for aluminum rigid conduit.

(25) **CONTROL SWITCH** — Construction features of Allis-Chalmers type 210 instrument and control switches and their advantages are described in a new bulletin. Write to the company at Milwaukee 1, Wis. Ask for bulletin 14B8112B.

(26) **INSULATING PRODUCTS** — A new 24-page catalog, designed to be a reference for insulating products for splicing and terminating wire and cables, is now available from Minnesota Mining & Mfg. Co., Dept. D9-37, 900 Bush Ave., St. Paul 6, Minn.

(27) **UNDERFLOOR DUCT** — The underfloor duct department of National Supply Co., 2 Gateway Center, Pittsburgh 22, Pa., offers a new six-page bulletin No. 493 on Spang electrical raceway fittings for communication and power distribution systems.

(28) **CATALOG** — A new eight-page general products bulletin has been published by Roller-Smith Inc., a subsidiary of Federal Pacific Electric Co. It deals with the company's lines of electrical indicating instruments and distribution and control equipment. Write to Federal Pacific Electric Co., 50 Paris St., Newark 1, N. J.

(29) **DISTRIBUTION SYSTEM** — Complete information for proper installation of a new, primary overhead insulated distribution system is carried in a 20-page technical bulletin recently published by Rome Cable Corp. Write to the company's Publications Division, Rome, N. Y. Ask for bulletin RCP-790.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after June 1

Please send me, without obligation, the new product information or catalogs:

If described in Product News, circle item number

1 2 3 4 5 6 7 8 9 10 11 12 13 14
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

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NAME ..... **TITLE** .....

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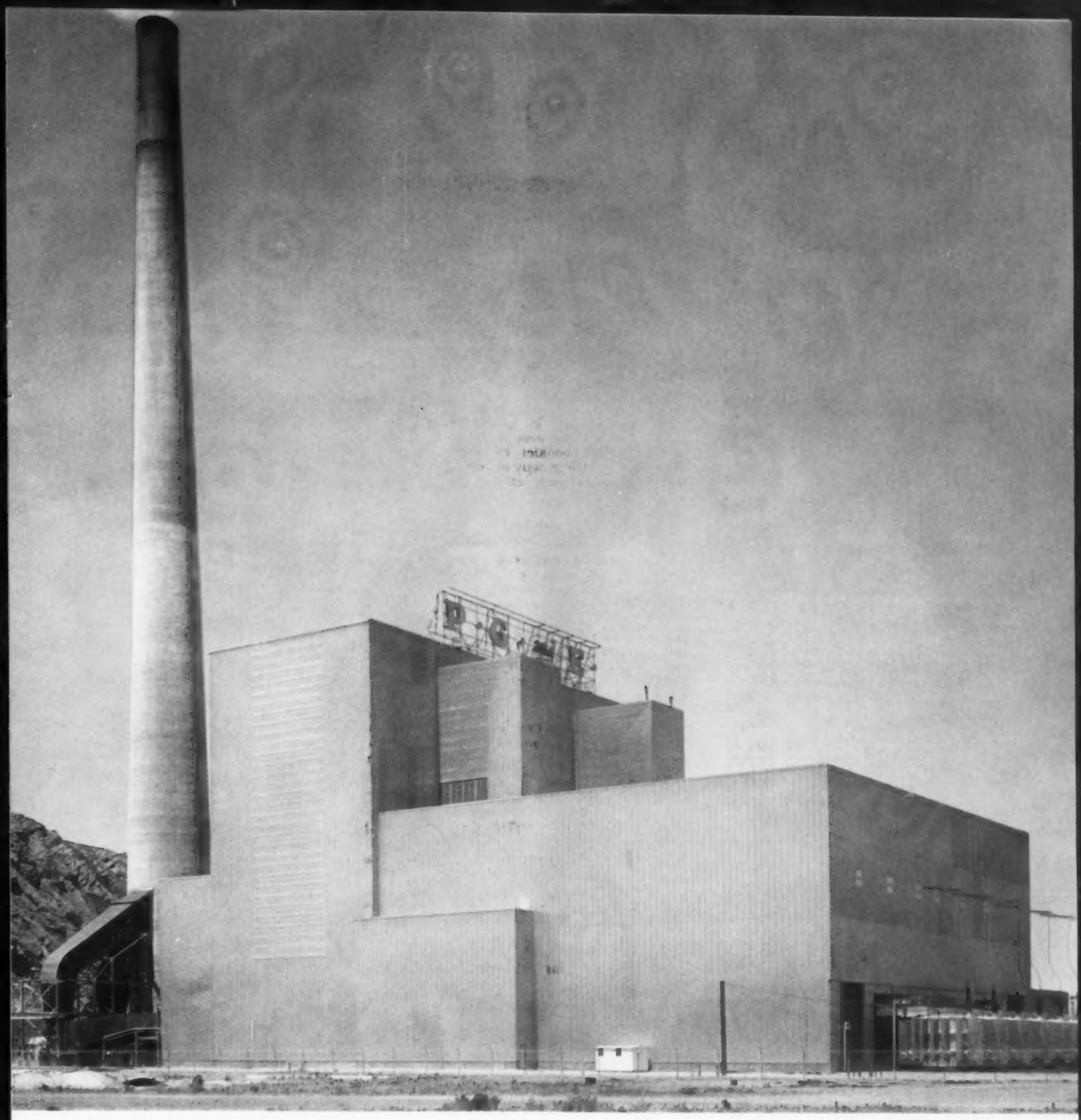
***Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.**

For phone number of closest representative see advertising index in back of book.



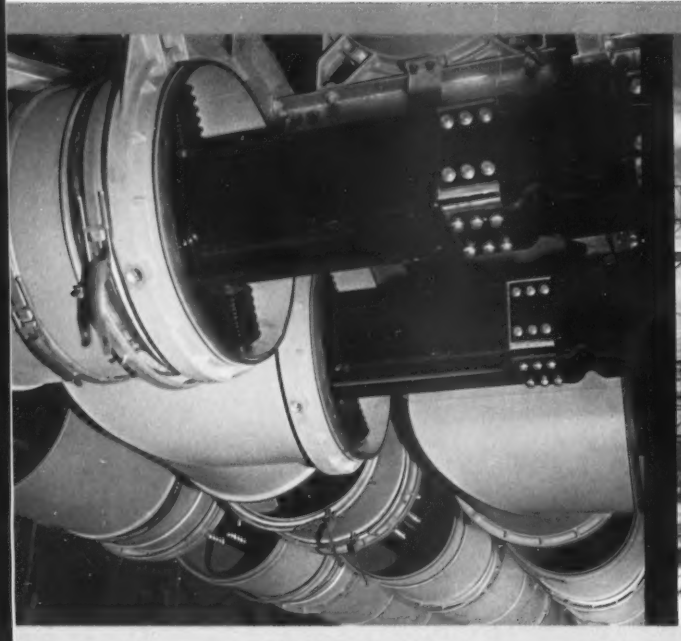
Pacific Gas and Electric Company's Morro Bay Power Station is an outstanding example of clean, modern lines achieved with ribbed walls of Alcoa Aluminum.

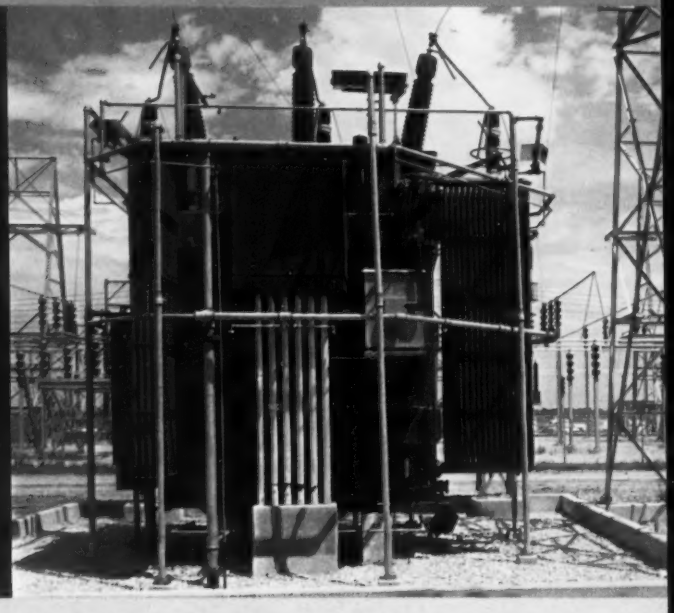
ALCOA RESEARCH

. . . development today for tomorrow's loads

HOW ALCOA ALUMINUM REDUCES COSTS IN GENERATING STATIONS

ALCOA'S THREE-PRONGED ASSAULT ON POWER STATION COSTS



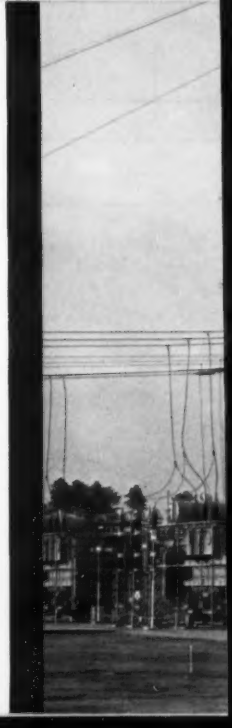


ARCHITECTURAL APPLICATIONS

There are three outstanding reasons why Alcoa Aluminum is the ideal building material for generating stations: low cost, freedom from maintenance and attractive appearance.

Walls of Alcoa Aluminum, uninsulated or sandwich type, go up fast. They require less supporting steel and a lighter foundation. They never need painting. Yet *sandwich wall of Alcoa Aluminum is the lowest cost, insulated metal wall system available.* Savings are also found in roofing, windows, conveyor framing and covers, handrails, grating, tread plate, fencing and many other applications. In every case, strong, lightweight Alcoa Aluminum offers a substantial bonus in corrosion resistance and permanent good looks.

Right: Maintenance-free beauty . . . Duke Power Company's Allen Plant at Belmont, North Carolina.



Through the years, Alcoa has adapted aluminum to new uses in power stations in three areas: electrical, architectural and mechanical. In every case, the objective has been the same: to reduce costs while advancing standards of performance. The result today is virtually an "all-aluminum" power station from conductors to condenser tubes, siding to stair treads. Everywhere you look, aluminum is helping utilities produce more kilowatts per dollar.

ALCOA

ALCOA RESEARCH

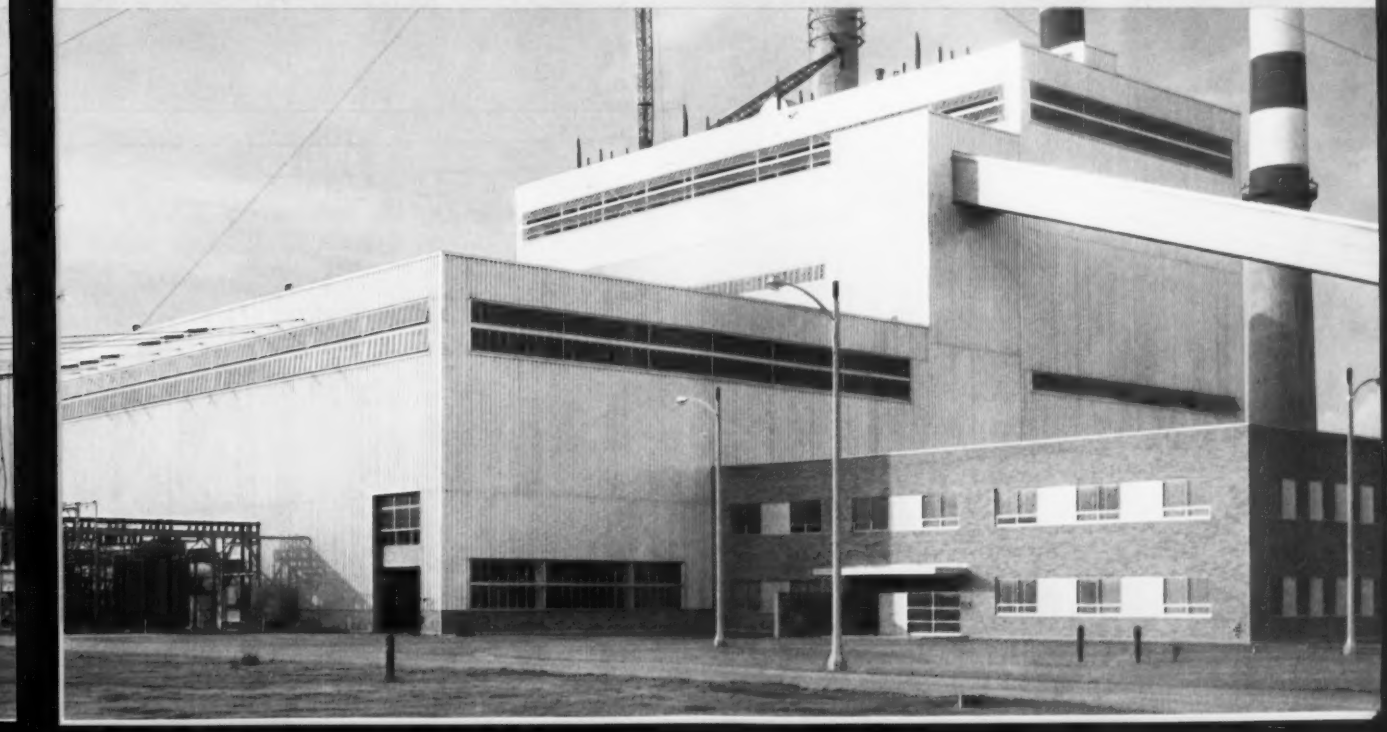
. . . development today for tomorrow's loads

ELECTRICAL APPLICATIONS

The same economy that accounts for almost universal acceptance of aluminum in overhead lines is yours if you specify aluminum for your power station. Alcoa® Bus Conductor, for example, is saving utilities many thousands of dollars, since an equivalent installation costs about one-half as much as copper. Conduit, crossarms and structures, cable, generator field windings, switchgear and isolated phase bus and enclosures, transformer windings and yoke end plates all represent opportunities for savings with Alcoa Aluminum. Soon transformer tanks and radiators will be available in aluminum. All these applications pay major dividends in lower maintenance costs, longer life and higher efficiency.

Left: Alcoa Rigid Conduit is used on this transformer at Kansas City Power & Light Company's Montrose Steam-Electric Generating Station.

Far left: Isolated Phase Bus made by Delta Star Division of H. K. Porter Co., Inc., with Alcoa Integral Web Channel Bus connected with aluminum bolts, aluminum enclosures and cast aluminum support rings at Commonwealth Edison Company's Fisk Station.

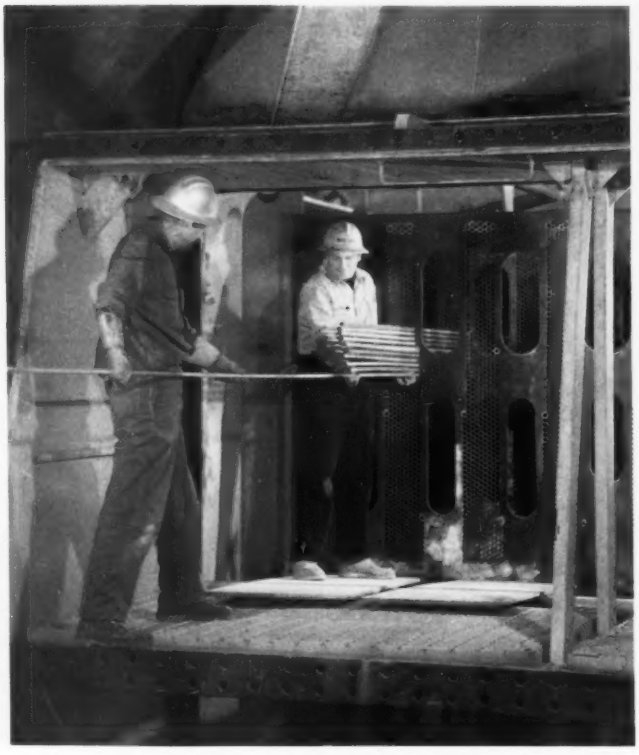


MECHANICAL APPLICATIONS

Among the foremost mechanical applications of aluminum are heat exchanger tubes. Low cost, as much as 50 to 60 per cent below other tubes, is combined with long life and superior resistance to carbon dioxide, hydrogen sulfide and ammonia. Moreover, heat transfer characteristics are equal to the best of competitive metals.

Aluminum's resistance to corrosion also accounts for major economies in condensate storage tanks, since no maintenance is required inside or outside and no iron is introduced into boilers.

In numerous applications including control tubing, tanks, covers, boiler lagging, jacketing, panels, canopies and low-pressure feedwater heaters, aluminum can help utilities to save on initial cost, on maintenance, through longer service—or all three.



Condenser tubes of Alcoa Aluminum being installed in an Allis-Chalmers Mfg. Co. surface condenser at The Detroit Edison Company's St. Clair Station.

FREE...

Find out more about the use of aluminum in power stations. *Alcoa Aluminum for Generating Stations* is a new booklet listing many of the latest applications of aluminum in this field—electrical, architectural and mechanical—and containing a complete list of all Alcoa literature available on each of these subjects. It's "must" reading for every cost-conscious utility executive. For your copy, write Aluminum Company of America, 2110 Alcoa Building, Pittsburgh 19, Pennsylvania.

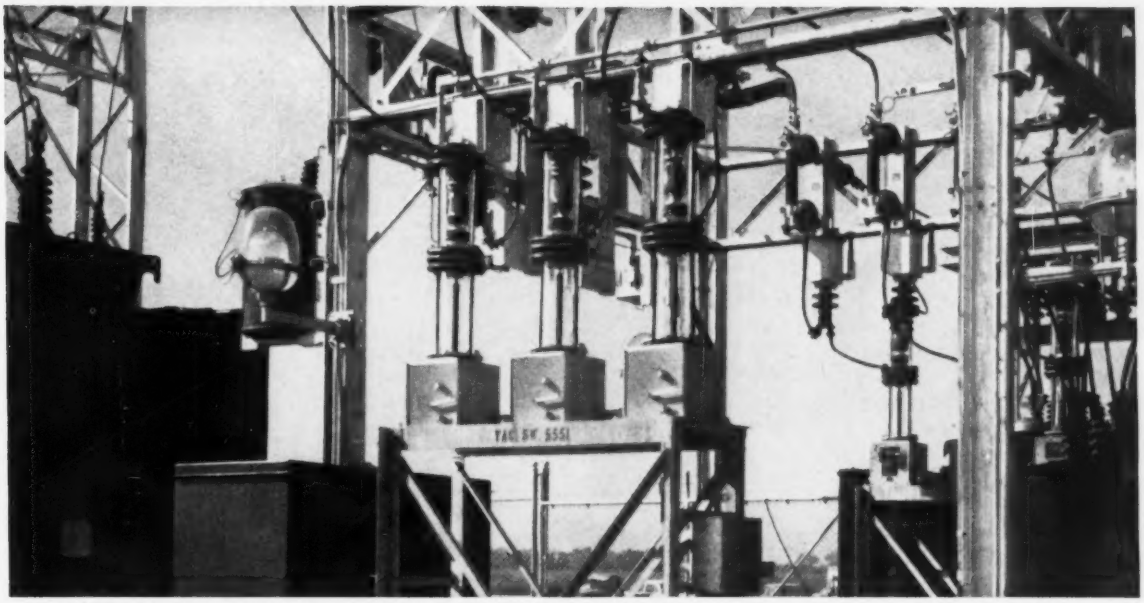
For more information on *any* application of aluminum in the electrical industry, call Alcoa.

ALCOA

ALCOA RESEARCH

. . . development today for tomorrow's loads

For Exciting Drama Watch "Alcoa Theatre," Alternate Mondays, NBC-TV, and "Alcoa Presents," Every Tuesday, ABC-TV



12 kv circuit breaker specified by International Steel Mills Equip. Corp., San Jose, Calif. for installation on Salt River Project System, Tempe, Arizona

Sensational New *Vacuum Power Switches* offer Long Life... *Maintenance Free!*

Exceptionally long life and elimination of maintenance were major considerations affecting the decision of International Steel Mill engineers to select Jennings vacuum power switches to control and protect their new 5000 and 2500 kva arc furnace transformers.

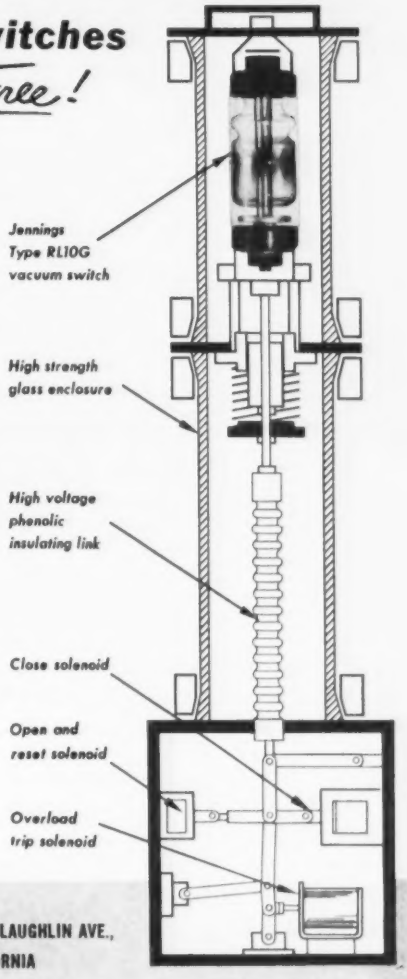
Jennings vacuum switches are able to provide long life because the combination of tungsten contacts plus a vacuum dielectric minimizes arc erosion which eliminates the problem of contact maintenance common to other high voltage switching devices. International Steel Mill engineers report contact life of 20,000 operations in a similar application.

The complete circuit breaker as supplied to International Steel Mills has been shown in the line diagram at the right to illustrate another inherent advantage of high vacuum switches. Their extremely high dielectric strength allows switchgear design with minute contact openings of only 5/32 inch permitting small, light-weight actuating mechanisms. Depending on requirements, fault current interruption can be accomplished within 1/2 to 2 cycles after the fault is initiated.

Vacuum power switches have proven particularly successful in applications involving capacitor switching, fault current interruption, transmission line dropping and load break switching.

Our distribution of vacuum switches is through switchgear manufacturers who design and build complete switchgear equipment, utilizing Jennings vacuum switches.

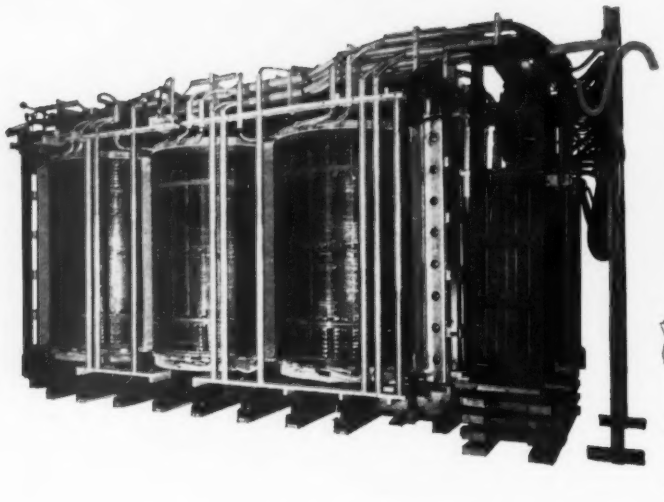
More detailed information on our ten sizes of power switches is available on request



Jennings®

RADIO MANUFACTURING CORPORATION • 970 McLAUGHLIN AVE., P. O. BOX 1278 • SAN JOSE 8, CALIFORNIA

For phone number of closest representative see advertising index in back of book.



The completed core-and-coil assembly showing the main, series and reactor transformers.

Note the substantial framework, the method of insulating and supporting the leads and the quality of workmanship, all of which are inherently a part of Moloney transformers.

Recently shipped to Consolidated Edison Co., of New York: two 100,000 KVA, 138 KV transformers designed to maintain proper voltage on the Consolidated Edison, Staten Island System

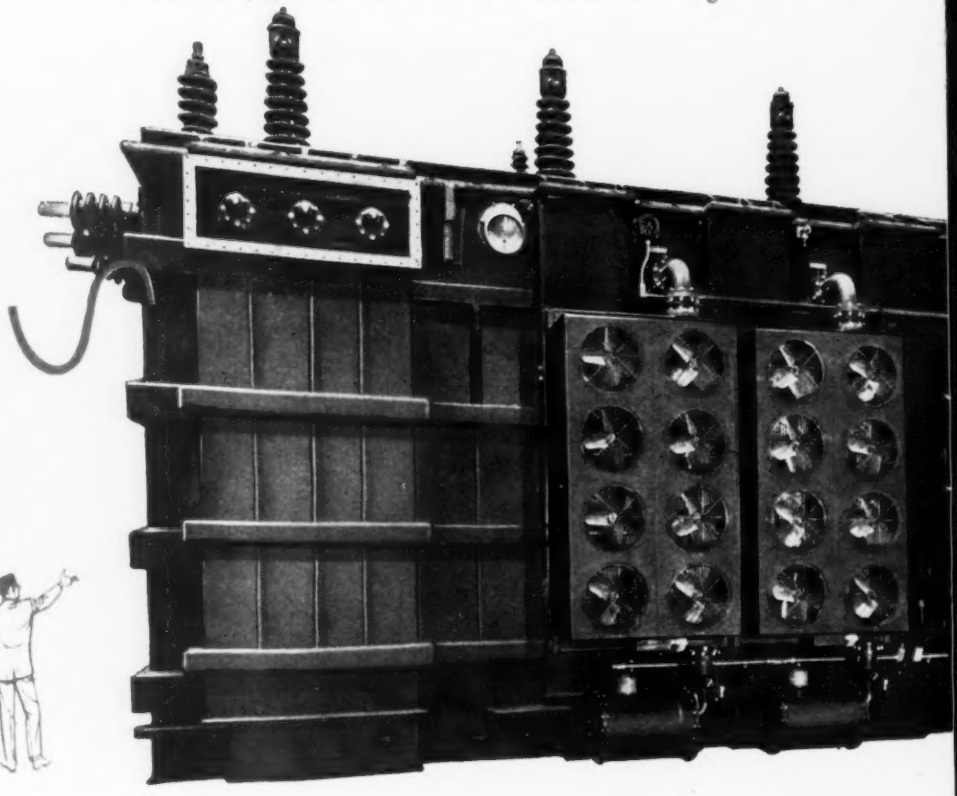
Low voltage side of a three phase, 60 cycle, LTC transformer, type OA/FA/FOA rated:

60,000/80,000/100,000 KVA

—High Voltage: 132,000 Volts

—Intermediate Voltage: 35,000Y/20,200 Volts

—Low Voltage: 13,800Y/7960 Volts at 12,000/16,000/20,000 KVA



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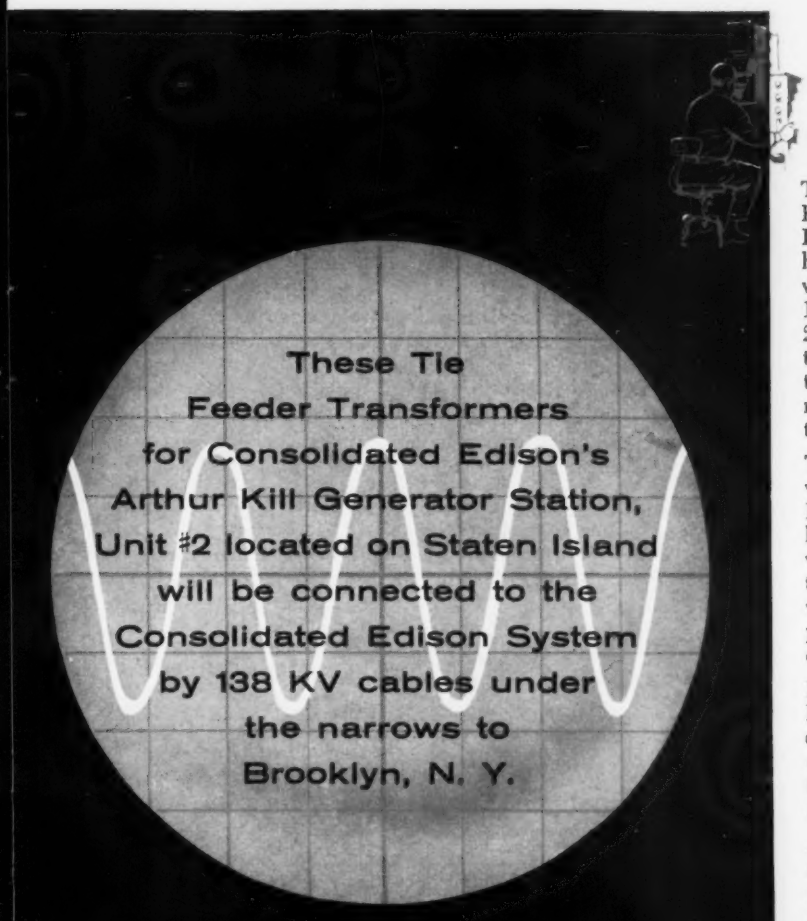


These units are 60,000/80,000/100,000 KVA, three phase, sixty cycle, type OA/FA/FOA transformers rated as follows: high voltage 132,000 volts, intermediate voltage 35,000Y/20,200 volts, low voltage 13,800Y/7960 volts at 12,000/16,000/20,000 KVA. They are equipped with load tap changing equipment in the 35 KV intermediate winding for plus or minus 12% regulation to provide regulated voltage for the Staten Island load.

The 13.8 KV winding is designed to provide start-up auxiliary power for Arthur Kill Generating Station, Unit #2, which has a rating of 335 MW. To stabilize the voltage of the intermediate winding due to this start-up load on the low voltage winding, a zero or slightly negative impedance is utilized in one branch of the equivalent impedance diagram.

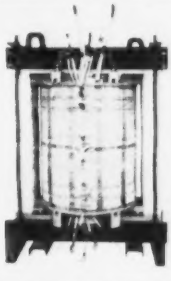
Due to the complexity of this design, Moloney built and tested a prototype to obtain the best possible design. The tests conducted on the prototype included tests to determine surge voltage distribution and impedance.

Another feature of these units, which was specified by the Consolidated Edison Company, is that they have a sound level considerably below the standard NEMA level.

Moloney Power Transformers are available in all voltage and KVA ratings in special or in standard designs. Contact your Moloney representative for information on any size or type transformer . . . Specify Moloney Transformers . . . All Along the Line.

MEBB-1

MOLONEY ELECTRIC COMPANY



Prototype of windings, used to determine surge voltage distribution and impedance.

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

SALES OFFICES IN ALL PRINCIPAL CITIES
FACTORIES AT ST. LOUIS 20, MO., AND TORONTO, ONT., CANADA

For phone number of closest representative see advertising index in back of book.

Neoprene jacket on Anaconda cable takes impact of avalanche

This 5000-volt cable had already provided 5 years of service when a strip mine mishap buried it under tons of rock. The cable was supplying power to a giant ore stripping shovel when an overhanging section of a 90-foot cliff suddenly collapsed.

The rockslide stretched, gouged and pounded a 500-foot section of the neoprene-jacketed cable . . . but didn't knock it out. The buried cable continued to maintain service.

To protect the strong internal construction of their cable, Anaconda Wire and Cable Company use jackets of Du Pont neoprene. Installations like this prove that neoprene has the necessary resilience to prevent cutting, gouging and impact damage, and neoprene's excellent weatherability and resistance to chemicals, oil, heat, cold-weather stiffness provide *protection that lasts.*

You can be sure of long-lasting performance when you specify neoprene jacketing on wire and cable. For details, write to E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept., Wilmington 98, Delaware.

DU PONT
REG. U. S. PAT. OFF.

SYNTHETIC RUBBER

NEOPRENE
HYPALON®
VITON™
ADIPRENE®

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

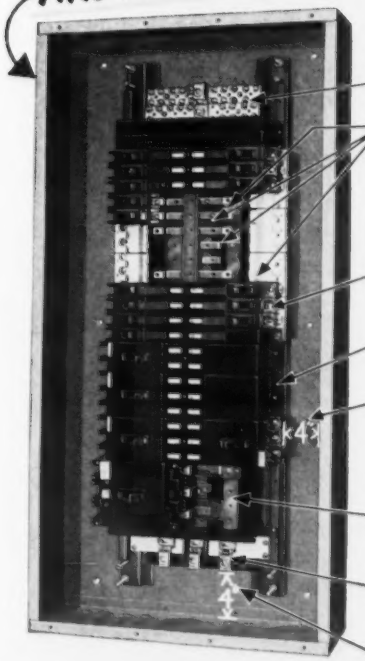
EW-4

For phone number of closest representative see advertising index in back of book.

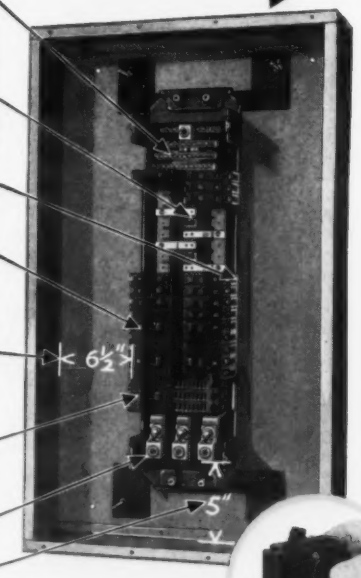
YOU ARE LOOKING AT THE GREATEST IMPROVEMENT IN PANELBOARDS IN MORE THAN 20 YEARS!

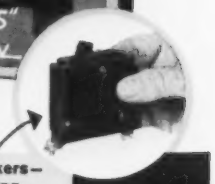
This is what you've been using

This is what Square D's New NQOB Gives You*



Binder-head Screw Neutral Taps	Box-type Neutral Lugs
Large Number of Parts Required for Additions and Replacements	Simplified Breaker Connection—One Screw All Joints Plated Bussing Like Wiring Diagram You Can See What Phase You're Connected To
Screw Terminals on Branch Circuit Breakers	Box Lugs on All Circuit Breakers
Unable to Mount One and Two Pole Breakers Opposite Three Poles	One and Two Pole Breaker May Mount Opposite Three Poles
Cramped Side Gutters	20"-wide Box Provides Roomy Side Gutters and Plenty of Room for Conduit in End Wall
Special Installation Required for 100 Amp Frame Breakers	100 Amp Frame Breaker May Replace Two 50 Amp Frame Breakers
Lugs for Copper Conductors Only	Lugs for Either Copper or Aluminum UL Approved
Minimum End Gutters	Full 5" End Gutters





Write for the complete story Square D Company, 4335 Valley Blvd., Los Angeles 32, Calif.

SQUARE D COMPANY

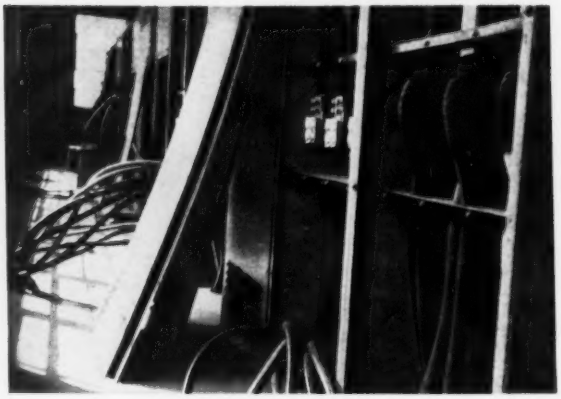
* The QO in NQOB means QWIK-OPEN breakers—they trip instantly at 10 times full load rating.
The B in NQOB means BOLTED CONNECTIONS. If you prefer plug-in construction, specify NQO

For phone number of closest representative see advertising index in back of book.

April, 1959–Electrical West

Installed in underground ducts, Paranite Super Pararite-Paraprene® network cable services a modern electronic computor installation.

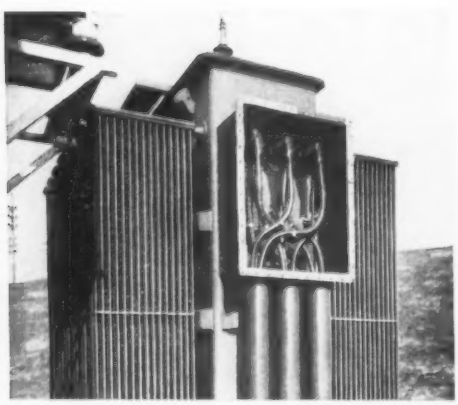
Paranite Super Pararite-Parasyn cables carry primary power between transformers and switchgear control panels in an ore reduction plant.



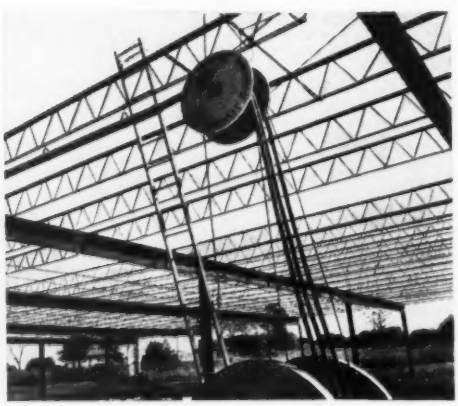
Across the nation for trouble-free installations...

PARANITE®

"IF IT'S PARANITE IT'S RIGHT"®



Paranite Super Pararite-Paraprene cable serves as the primary transformer feeder in a new municipal water pumping station.



Overhead duct installation of Paranite Super Pararite-Parasyn® (PVC) serves as a secondary feeder cable in a manufacturing plant.

The consistent selection and performance of Paranite cables from 600 volt network through 23,000 volt power cables mark them as products of close quality control. These Super Pararite-Paraprene and Super Pararite-Parasyn (PVC) cables illustrated above, indicate the versatility, national availability and proven trouble-free performance of Paranite installations.

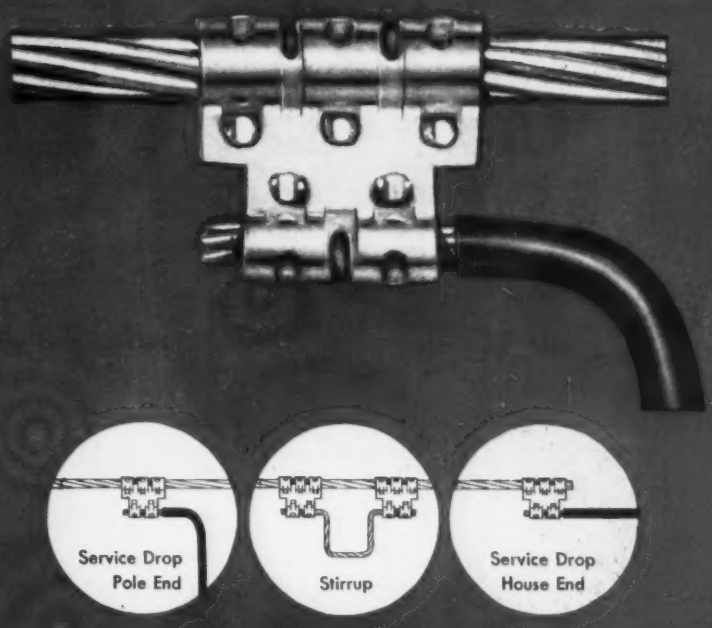
PARANITE WIRE AND CABLE DIVISION

Essex Wire Corporation, Fort Wayne, Indiana

MANUFACTURING PLANTS: Marion, Ind.; Jonesboro, Ind.; Tiffin, Ohio; Birmingham, Ala.; Anaheim, Calif. • Sales Offices in All Principal Cities

For phone number of closest representative see advertising index in back of book.

The TAP that TOPS them all...



THE MULTI-PURPOSE AMP UTILI-TAP for aluminum and/or copper conductors

Tired of all the expensive clutter in your stock rooms—a special tool for this, a special piece of hardware for that? Now you can clear out a lot of your inventory clutter with all new A-MP UTILI-TAP

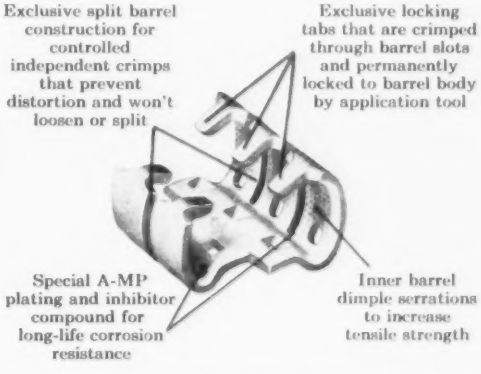
Here is a product that can be used on diverse tapping installations—like no other product on the market. It's permanent, it's sure and it will do many, many jobs.

Your stock can be simplified and easily maintained. Your linesmen can now go up the pole without pockets filled with miscellaneous parts or belts loaded with special tools. Simplify with the A-MP UTILI-TAP

Light-weight matched tooling available in mechanical or hydraulic types.

The only tap on the market that converts from an easily attached open barrel construction to a permanent, closed barrel attachment.

Look at these unbeatable features:


Exclusive split barrel construction for controlled independent crimps that prevent distortion and won't loosen or split
Exclusive locking tabs that are crimped through barrel slots and permanently locked to barrel body by application tool
Special A-MP plating and inhibitor compound for long-life corrosion resistance
Inner barrel dimple serrations to increase tensile strength

Full range of wire size combinations for aluminum, copper or ACSR conductors.

Send today for more information to solve your tap inventory and reliability problems simultaneously.

American Pamcor, Inc.

GENERAL OFFICES: 181 HILLCREST AVE., HAVERTOWN, PA.

Exclusive Distributor For AMP Products To The Utility Industry

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NOW YOU CAN HAVE BOTH

FAMOUS ALL-BRITE HI-OUTPUT INDUSTRIAL

PLUS

A NEW 30° MATCHING LOUVER for GUIDED LIGHTING . . .

ALL-BRITE ALL NEW LOUVER Power Groove

DESIGNED SPECIFICALLY FOR ALL THESE GREAT LAMPS: VHO, SHO, Power Groove

BUILT LIKE A HEAVY-DUTY TRUCK: STRONG, SOLID, SAFE

send for catalog and data sheet

All-Brite

LIGHT OF AMERICAN COMMERCE

ALL-BRITE FLUORESCENT FIXTURES, INC.
352 SHAW ROAD, SOUTH SAN FRANCISCO, CALIF.

PLANTS ALSO IN LOS ANGELES AND SEATTLE.
IN CANADA: ALL-BRITE LIGHTING (B.C.), VANCOUVER, B.C.
REPRESENTATIVES THRUOUT THE UNITED STATES AND CANADA

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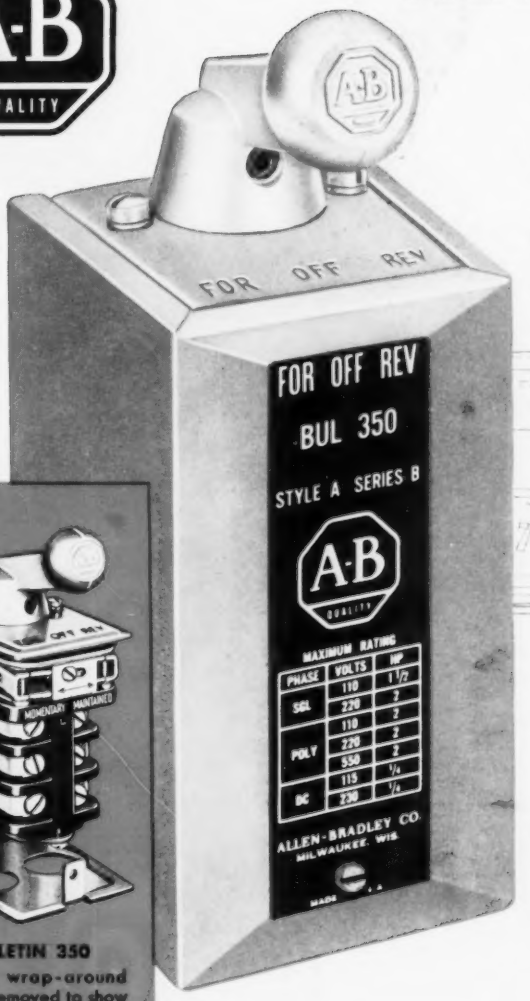
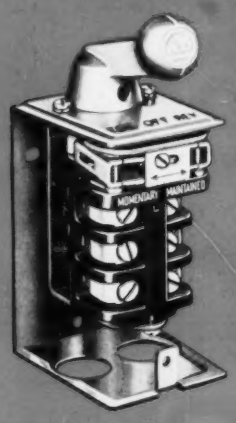
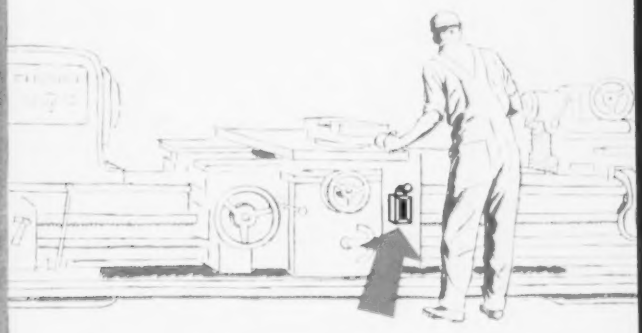
ALLEN-BRADLEY

REVERSING DRUM SWITCHES





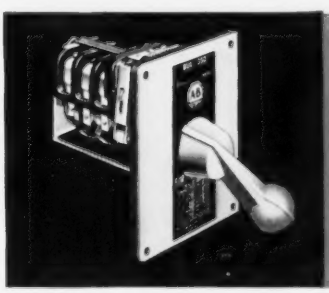
BULLETIN 350
Style A wrap-around cover is removed to show the readily accessible front wiring terminals. Max rating: 2 hp.



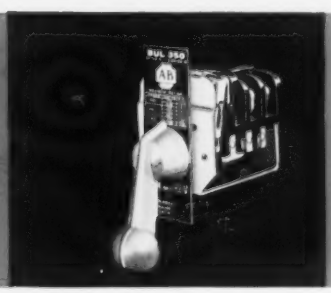
...styled to match the most modern production machines!

Inside and out—this Allen-Bradley drum switch is *all* new. Its trim, modern lines and attractive die-cast aluminum handle will give your production machines "up-to-the-minute" styling.

But there is more than beauty to this new switch. The rugged switch mechanism is a self-contained unit—independent of the enclosure. Misalignment and binding *cannot* occur. The base mounts directly on machine surfaces—without using spacers. And with the wrap-around cover removed, terminal screws are exposed for fast wiring—from the front. Changeover from momentary to maintained contact operation can be made in seconds. Investigate this new "leader" in its field. Send for Publication 6091.



OILTIGHT CAVITY MOUNTING
A-B Style AF reversing switches can be furnished with sealed shaft and rubber-gasketed, oiltight cover for cavity mounting in a machine base.



PANEL MOUNTING
The new Style A switches can be furnished for mounting directly on panels. Nameplate which gives ratings is also included with each switch.

ALLEN-BRADLEY

Quality Motor Control

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

3-59-MR

Reversing Drum Switch for across-the-line starting and reversing a-c and d-c motors. Interlocks available. Bulletin 350. Max ratings: A.C. 20 hp, 220v; 40 hp, 440-550v. D.C. 3 hp, 115-230v.

Speed Regulating Drum Switch for starting and regulating duty of wound-rotor motors. Bulletin 375 non-reversing. Max ratings: 500 hp, 220-440-550 v. Bulletin 385 reversing. Max ratings: 60 hp, 220 v; 75 hp, 440-550 v.

Multi-speed Drum Switch for starting, speed changing, and reversing of multi-speed squirrel cage motors. Bulletin 365. Max ratings: 75 hp, 220 v; 150 hp, 440-550 v.

A-B QUALITY

For years of dependable performance

ALLEN-BRADLEY DRUM SWITCHES

have no equal!

These Allen-Bradley drum switches provide simple and economical control for alternating current motors. Although low in cost, these unusually rugged switches are built under Allen-Bradley standards of *quality* . . . your assurance of reliable, trouble free performance. And this broad line of drum switches offers a variety of mounting types, operating handles, and interlocks to satisfy practically every requirement. Let us send you details on this versatile line of drum switches.

ALLEN-BRADLEY

Quality Motor Control

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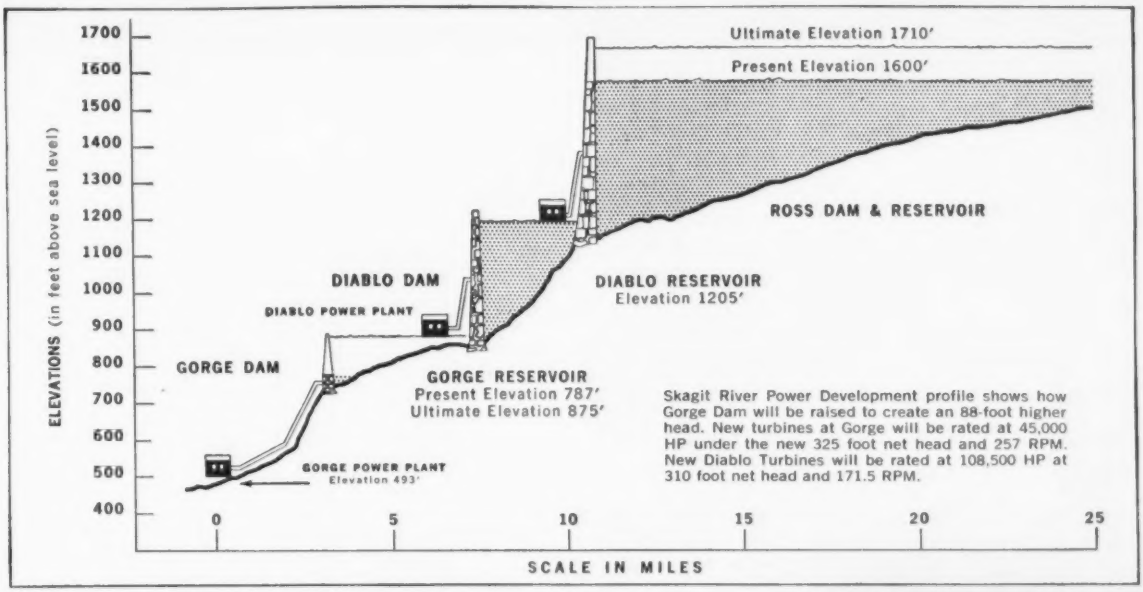
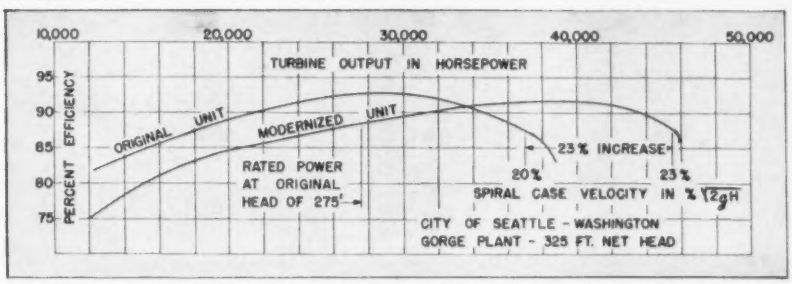
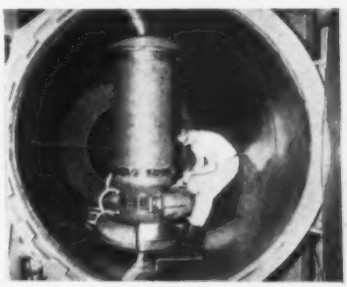
3-59-MR



Skagit River Power Development profile shows how Gorge Dam will be raised to create an 88-foot higher head. New turbines at Gorge will be rated at 45,000 HP under the new 325 foot net head and 257 RPM. New Diablo Turbines will be rated at 108,500 HP at 310 foot net head and 171.5 RPM.



This shows the Laboratory Test performance (power stepped up for head and size), of the existing Gorge runners under the higher head and the new runner and gate design for the same conditions.



A complete model of the Gorge wheel case assembly, built to extreme accuracy, is shown being mounted in the test chamber of the high-head test stand in York, Pa.

CITY OF SEATTLE TO GET MORE POWER

New Turbine Designs in Modernization of Gorge, Diablo Facilities Will Help Increase Capacity 23%

As part of its program to get more power, Seattle, Washington's Skagit River development includes replacement of 35- and 22-year-old turbine runners at the Gorge and Diablo plants, and increasing the height of the Gorge Dam. Rebuilt vertical Francis runners and new wheel case accessories will give each unit 23% more capacity in the existing wheel cases.

Extensive model tests, conducted in the Allis-Chalmers Hydraulic Division laboratory's high-head test stand, proved that the proposed new runner and modified gate designs would provide the increased power with very little loss in efficiency. In addition, they would have improved cavitation characteristics to permit maintaining the original setting above tailwater elevation.

Research results such as these indicate Allis-Chalmers can provide substantial economies in both new and existing installations with higher turbine speeds and settings as well as smaller spiral cases and inlet valves. For further information, write Allis-Chalmers Manufacturing Co., Hydraulic Division, York, Pennsylvania.

Since the Diablo units have gone into service, the city of Seattle advised that, prior to final testing, performance indicated that anticipated increase had been substantially met.

Hydraulic Division

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Hydraulic Turbines & Accessories • Pumps • Liquid Heaters
Rotovalves • Ball Valves • Butterfly Valves • Free-Discharge Valves

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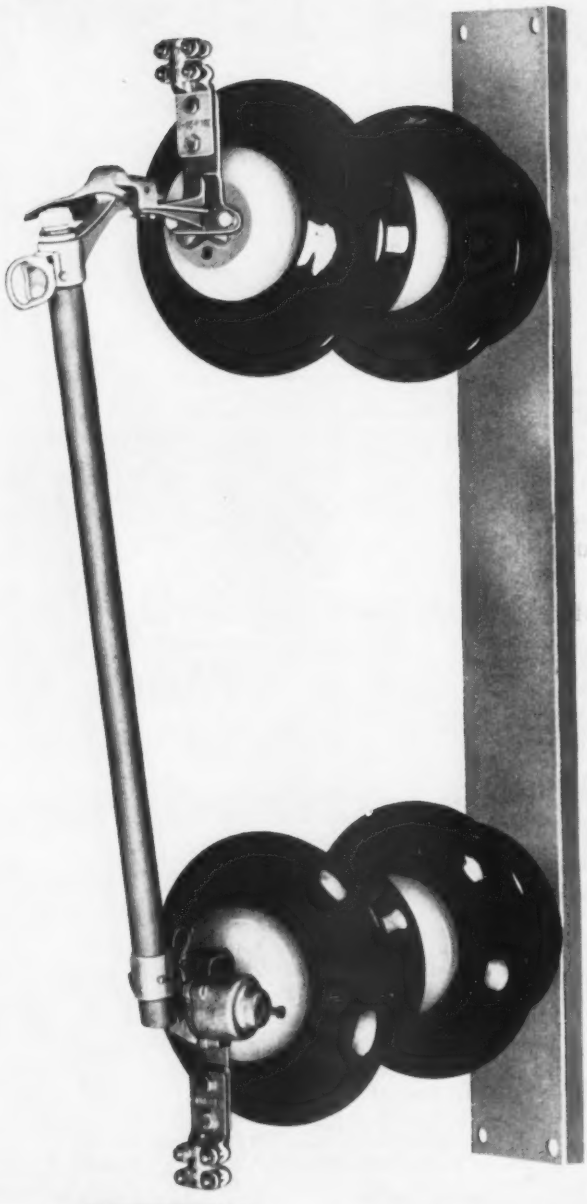
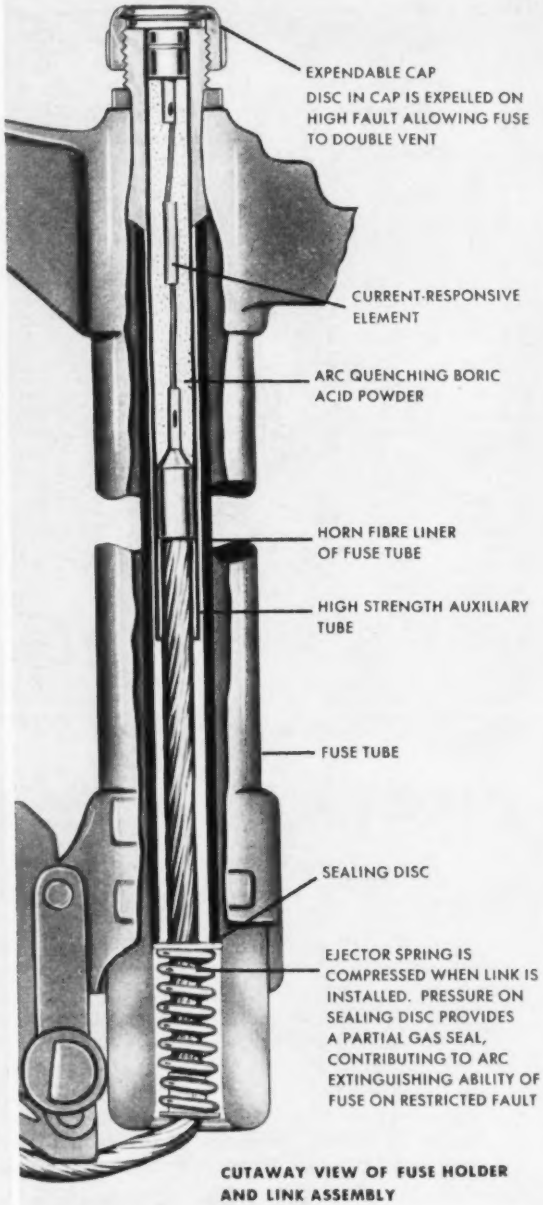
A Reliable New Family of




EXPENDABLE CAP
DISC IN CAP IS EXPELLED ON HIGH FAULT ALLOWING FUSE TO DOUBLE VENT
CURRENT-RESPONSIVE ELEMENT
ARC QUENCHING BORIC ACID POWDER
HORN FIBRE LINER OF FUSE TUBE
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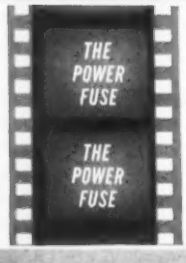
FUSE TUBE
SEALING DISC
EJECTOR SPRING IS COMPRESSED WHEN LINK IS INSTALLED. PRESSURE ON SEALING DISC PROVIDES A PARTIAL GAS SEAL, CONTRIBUTING TO ARC EXTINGUISHING ABILITY OF FUSE ON RESTRICTED FAULT

CUTAWAY VIEW OF FUSE HOLDER AND LINK ASSEMBLY



Don't miss this sound movie in full color..."The Power Fuse"

It is available, without cost, for viewing by anyone interested in power fuses. On-the-spot results of field tests conducted in conjunction with a leading utility. Factual, informative, well worth your time. Contact your Southern States representative to arrange a showing, or write direct to the company.

Power Fuses by Southern States

- POSITIVE CLEARANCE OF RESTRICTED FAULTS
- HIGHEST INTERRUPTING RATINGS AVAILABLE
- WIDEST RANGE OF SELECTION
- SIMPLIFIED CONSTRUCTION

Reliable performance—to provide dependable protection against high or low fault currents—is one of the most important requirements demanded of power fuses by engineers. With this uppermost in mind, we developed our new family of power fuses.

Extra reliability in clearing restricted faults is provided by the new, dual-operating characteristics of the expendable cap and arc-quenching boric-acid fuse link.

Extra reliability in handling high faults is provided by the double-venting action, fibreglass tubes and other design features—resulting in interrupting ratings approaching 3½-million kva at 161 kv.

A wider range of selection permits adequate fusing without buying excessive interrupting capacity.

The expendable cap and the sealing disc at the lower end of the fuse prevent the entrance of moisture or extraneous matter. Patented electrostatic shielding eliminates corona damage. A built-in snubber brings the fuse holder to a cushioned, shock-free stop. All in all, this rugged new family of power fuses is engineered to provide completely reliable service for many years.

Get the full story from your Southern States representatives, or write for Bulletin 59PF.

RE-FUSING IN THE FIELD IS QUICK WITH SOUTHERN STATES FUSE KITS

Economical fuse kits, with all of the components necessary for re-fusing in the field, are available for all Southern States Power Fuses. Four speed ratios—clearly marked, compact packages.

PIONEERS IN POWER FUSES SINCE 1924

SOUTHERN STATES EQUIPMENT CORP.
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IN CANADA: Dominion Cutout Co., Ltd., Toronto

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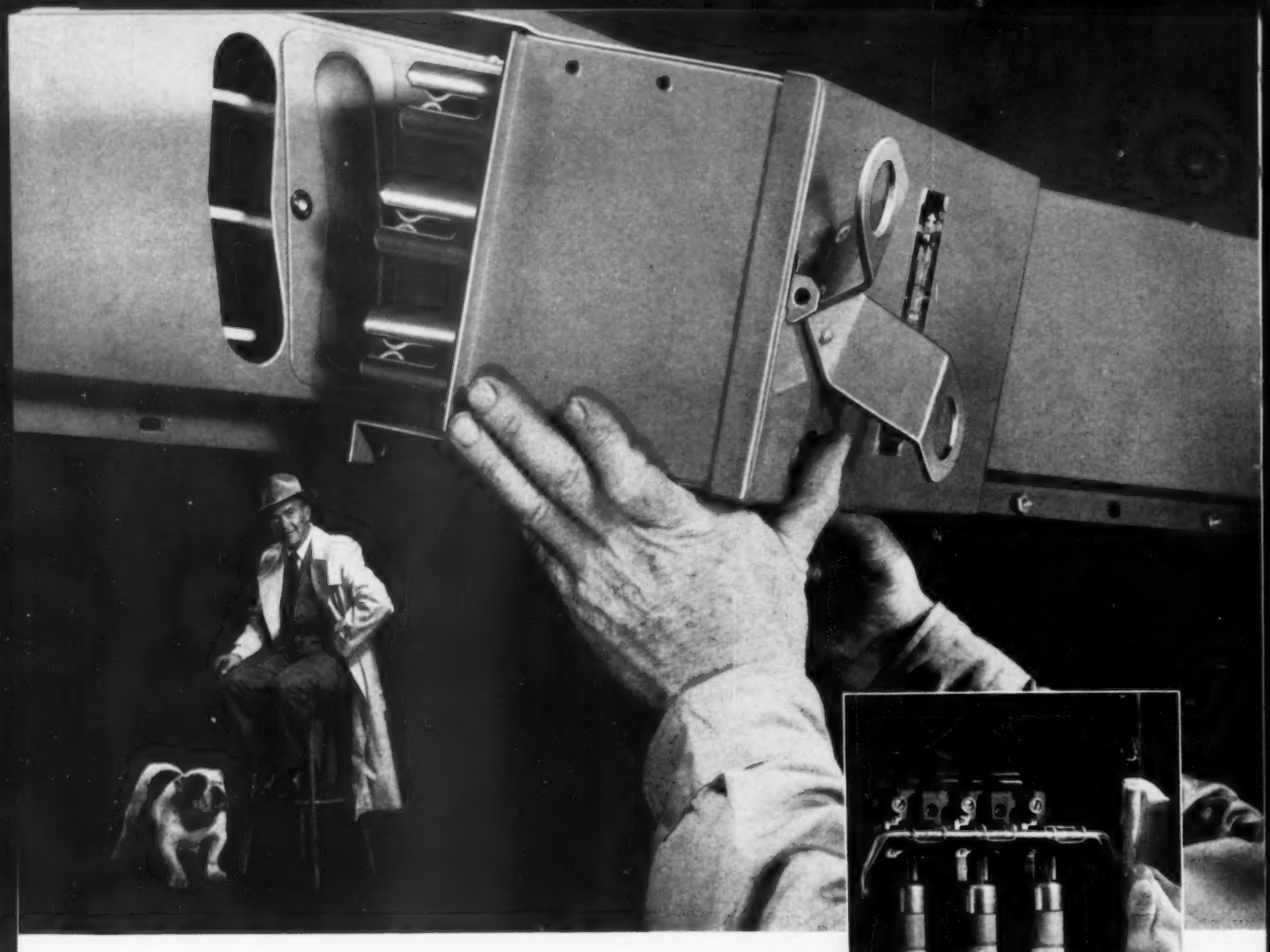
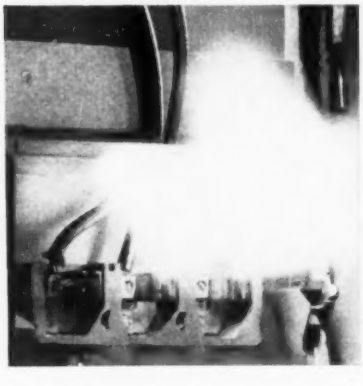


Vacu-Break chamber, shown above, smothers arcs at instant of break before they can pit or burn contacts. Dangerous flash explosion occurs at instant of "break" in open knifeblade unit shown below.



GET VACU-BREAK SAFETY IN BUS DUCT BY BULLDOG

And here's real built-in flexibility, too! Circuits plug in wherever needed with complete safety.

BullDog Plug-in Duct provides openings on 20-inch centers on either side of the duct. To tap "live" power you simply insert Vacu-Break® bus plugs. As the picture shows, reinforced fingers on all plugs insure positive pressure contact. Exclusive Vacu-Break action safeguards circuits and personnel. The enclosed arc chamber limits the oxygen supply . . . actually starves the arc before it can explode and pit or burn contacts. (The Vacu-Break bus plug has six companion plugs to meet other applications.)

Plug-in Duct is powered by Lo-X feeder duct—together they form BullDog's integrated BUStribution® system. Both ducts are available in standardized and interchangeable straight sections, elbows, tees and crosses . . . can be installed sideways, on edge, vertically or horizontally.

Protect clients against rewiring, downtime and costly production shutdowns! Specify *Bus Duct by BullDog.*

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I-T-E CIRCUIT BREAKER COMPANY
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Consult the following Pacific Coast representatives:

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Young Electric & Mfg. Co.
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910-89th Avenue
Oakland 21, California

BullDog Elec. Prod. Co. of Los Angeles
2885 E. Washington Blvd.
Los Angeles 23, California

For phone number of closest representative see advertising index in back of book.

ELECTRA'S HUSBAND

"It Takes Womanpower . . ."

IT WAS a couple of days after the PCEA Business Development conference before I had time to tackle Electra on one of the things I heard there.

"Electra," I began amiably enough. "You sound pretty impressive when you get to talking about the American housewife. . . ."

"Homemaker," Electra corrected.

"Okay, okay, a home is not a house. But whatever she's called, you seem to think she is a pretty intelligent gal, the inquiring type who wants to know what makes things tick in her department. Well, let me tell *you* something. That's a lot of boloney. Twenty-six out of 30 of them—and that includes college people—don't know how many circuits they have in the house."

"So what?" Electra asked as she pushed down the toaster lever.

"My dear lady, have you any idea how much the electrical industry has spent in dollars and energy on the Housepower program?" Suddenly the coffee tasted bitter.

"No." She smiled sweetly. "Tell me."

"Well, plenty." I hurried to distract Electra before she demanded an exact figure. "But let me tell you about this survey and then see what you have to say. Dick Riley and John McNeese decided to let the women talk at one of the residential wiring committee sessions to get their ideas on the housepower program. Darn good idea too, because it's the women we have to sell and we don't think we're getting to them.

"Anyway one of these women panelists, Dr. Leuhning of San Francisco State College, decided to have 30 women, some of them connected with the college and some not, interviewed. She and Walter Abraham of PG and E made up a simple questionnaire with 10 or 11 questions. Dr. Luehning brought along the answers, lumped because there was no difference in response between the college-connected and the general public groups. And what do you think?"

Electra rattled her coffee cup and I didn't wait for her answer.

"The only blessed thing most of them knew about their wiring was where the main switch and fuse box were. One didn't even know what a circuit *is*."

"Interesting, if true," Electra mused—"that only one didn't know, I mean."

"They knew what appliances they had, of course," I continued, ignoring the interruption, "but when asked how many more they thought they could use with the amount of electricity in their homes, 14 said they didn't know and had never thought about it. Asked whether a vacuum cleaner or a toaster used more electricity, 18 said a vacuum and three hadn't the slightest idea. What's more, 13 thought a mixer took more juice than a hand iron and five wouldn't even guess."

"Awful!" Electra was plainly amused and I was getting exasperated.

"Electra," I remonstrated. "You don't realize how important this housepower program is to everybody in the electrical business (and incidentally to you) and what's more you're making a joke of the whole idea."

"I do and I'm not," she said gently. "I know what you are about to say. Every one of the things those women didn't know is explained in simple language in any one of several pamphlets you brought home from the office. They are beautiful and they were written especially for women and I think you people are to be congratulated on a good job."

"But," I groaned, "most of the panel members—home economists and newspaper women—didn't seem to know the books were available and you know how we've worked to circulate them."

"Well, they know now," Electra said comfortingly. "All I'm trying to say is that the success of your program should not be measured by what you've managed to teach women about wire sizes and circuits, not exactly fascinating subjects to us. But wasn't there some question on that list that asked whether or not they were interested in having *enough* housepower?"

I brightened. "Yes, there was. And you're right. They did better there. Only seven said 'no' when asked if they were interested in electrical wiring and outlets when they bought or built. Ten were interested themselves and 13 said they weren't but their husbands were. And 23 women looked into the number of outlets and their placement."

"I could have told you most of this without a survey," said Electra smugly.

"If that's true, why haven't you been more critical of some of the things you know we're doing?" I retorted heatedly.

"Well, I'm a great one to believe that tidal waves must run their course. You men are obsessed with the idea that we women want to know why things operate. It's going to take a lot of convincing that most of us only care that they *do* operate. I can remember all the hullabaloo about adequate wiring. That didn't get through so you cooked up a Housepower campaign. Now you tell me it too is a slow process. And you are finally coming around to the real approach that will make us homemakers pay attention."

"What's that?" I asked suspiciously.

"Why, it shows up on your survey." Electra acted surprised that I could be so stupid. "It's the idea of selling a Gold Medallion home or an all-electric home—the house that does everything. We don't care what's in the walls—we just know it is "adequate" or has all the "power" it needs to make housework easier and leisure more enjoyable.

"And if you really wanted to jostle us a bit—you'd appeal to our pride by having three or four grades of Medallion Homes, maybe a gold, silver and bronze rating on a house. Then you'd find women asking why she can't have a gold one. Sometimes I wish I could run your business for awhile, at least the part that has to do with women."

"Don't be modest, Electra," I chided, "all you want is practically the whole works. Didn't you see the statement that women control 80% of the family spending?"

"That's as it should be—and maybe if women went after it you'd get a bigger percentage for electrical wiring. By the way, there's something wrong with the TV plug in our bedroom. Shall I call an electrician or do you know where the fuse box is?"

ANACONDA'S CABLE EXPERIENCE: THE ALL-IMPORTANT "EXTRA" IN ACSR CABLE!

Anaconda has been producing cable for over 50 years. Thus into the ACSR cable you buy today goes all the skill and knowledge of design, manufacture and research of half a century. *This* is cable experience – experience gained from working with many types of cable.

How do *you* gain from this experience?

First of all, you get a superior cable—one that will give you long years of sure service.

Second, Anaconda's field engineers are able to provide you with the kind of cable counsel that results in both time and money savings.

Before you start your next job, see the Man from Anaconda. Backed by the broadest line of wire and cable in the industry, in both copper and aluminum, he is highly qualified to help you arrive at the best answer to your cable needs.

Multi-mill manufacturing facilities—strategically located across the country—assure speedy service. Write or call today: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

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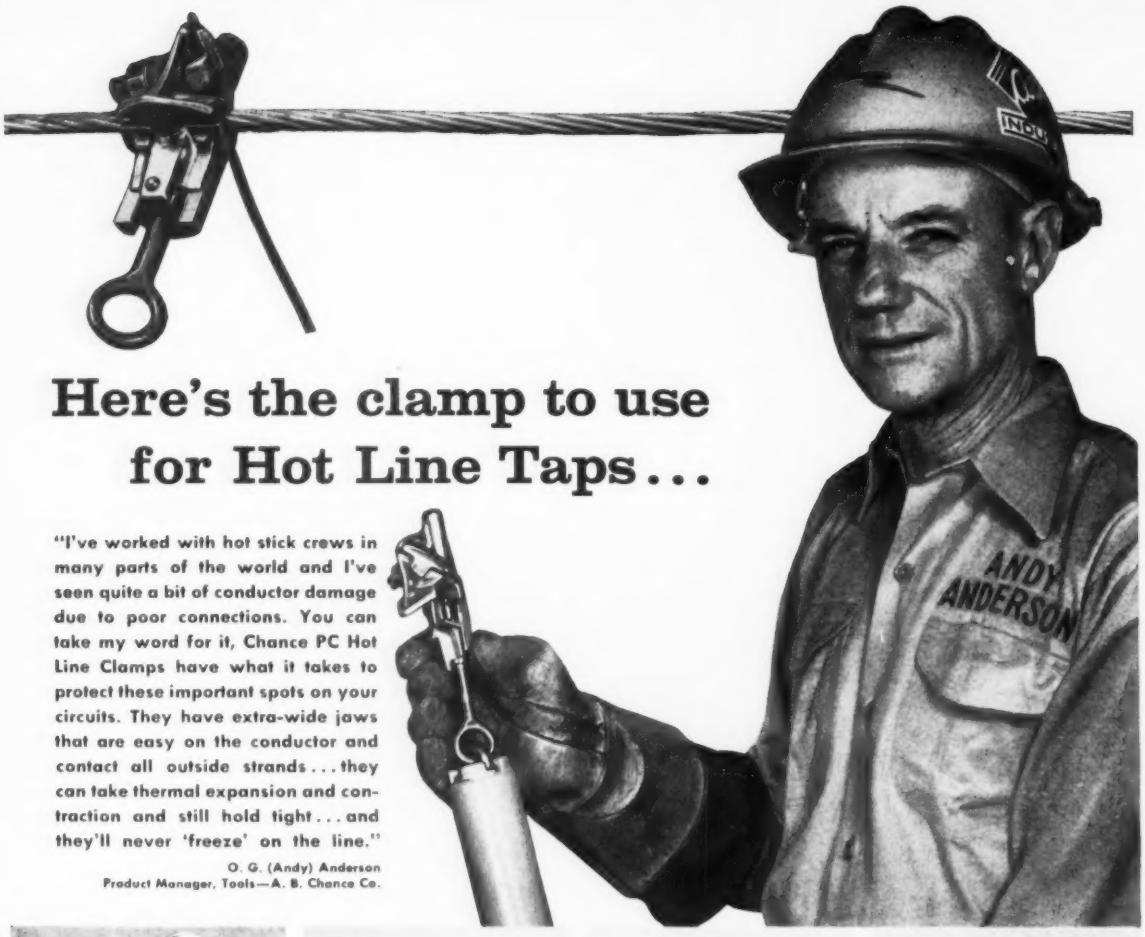
Stringing 230,000-volt line on steel towers between Brownlee development and Boise, for the Idaho Power Company. The transmission line uses 408 double-circuit towers spanning 100 miles of rugged terrain. Cable was strung from trucks like these, to fill increasing power needs of the Pacific Northwest. This project will contribute, in addition to power, flood control, recreational fish conservation and navigation benefits.

ASK THE MAN FROM

ANACONDA®

FOR ALUMINUM WIRE AND CABLE

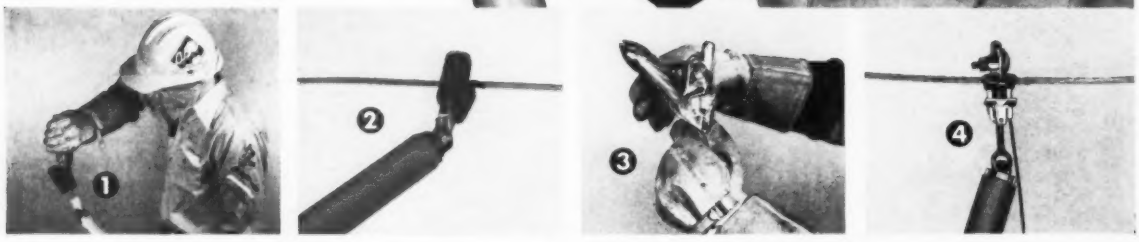
FASTEST WESTERN SERVICE—At Orange, California, Anaconda's expanded, modernized mill fabricates and stocks copper and aluminum wire and cable for *every type of application*. Anaconda assures the fastest possible service on all West Coast needs. See Anaconda Sales Offices: Los Angeles, San Francisco, Seattle, Denver.



Here's the clamp to use for Hot Line Taps...

"I've worked with hot stick crews in many parts of the world and I've seen quite a bit of conductor damage due to poor connections. You can take my word for it, Chance PC Hot Line Clamps have what it takes to protect these important spots on your circuits. They have extra-wide jaws that are easy on the conductor and contact all outside strands... they can take thermal expansion and contraction and still hold tight... and they'll never 'freeze' on the line."

O. G. (Andy) Anderson
Product Manager, Tools—A. B. Chance Co.



...and here's the way to get a lineman's cooperation in making trouble-free connections

Make it as easy as possible to apply clamps with **z.l.n. 100** by buying Chance clamps packaged with this *Contact Aid* pre-applied. Our engineering research and our experience with many utilities has taught us that Chance **z.l.n. 100** *Electrical Contact Aid* and a wire brush are the first requirements in making a long-lasting hot line tap. 1. Apply **z.l.n. 100** *Contact Aid* to the conductor cleaning brush. 2. Wire brush the contact area of the conductor to remove surface oxides and to apply the corrosion inhibiting *Contact Aid*. 3. Remove the plastic package from a Chance "Protected Connection" Clamp—(the *Contact Aid* is pre-applied to a factory-clean clamp). 4. Install the clamp—It's specially engineered for hot line taps that will let you give your customers continuous electrical service without danger of burn-downs and allow you to easily remove the service if necessary.

Chance "Protected Connection" Type PC Clamps are available in a complete range of sizes that can take from No. 6 ACSR to 1,431 MCM ACSR and comparable sizes of copper conductor. There's a type for every contact combination—including the Chance AGP with heavy fortified cadmium coating for additional protection on bimetal connections.

A. B. CHANCE COMPANY General Offices CENTRALIA, MISSOURI

CC59-4

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ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. VOL. 122, NO. 4 APRIL 1959

Manufacturers step up Western industrial output.
Utilities anticipate industrial load growth.
Communities look for major job increases.

It all adds up to . . .

$1,000,000,000; 1,000,000 Kw

A billion dollars will be spent for growth and expansion by manufacturing industries in the West this year. This figure will come as no surprise to anybody because it is the one that has been most widely used as business leaders begin to get the answers back from market investigations. To determine the validity of the figure, ELECTRICAL WEST queried Chambers of Commerce, industrial development councils, etc., in the major metropolitan areas of the West last month. The result? The figure of $1,000,000,000 is conservative. It is conservative because although the areas replying to the questionnaire were the major industrial centers, they still contain only about half the total population of the West.

Summarizing the reports of commitments that have been made locally, it appears that 319 *new* industries will spend $570,820,000 for Western facilities, and that 667 *existing* industries will spend $324,160,000 on expansion. When it is considered that the three major centers of Long Beach, Denver and Seattle, plus a number of other smaller but busy population centers did not report, the $1,000,000,000 figure seems even more conservative. We also asked how much would be spent for modernization of plants but the reports were inconclusive, so whatever is done can be added to this total.

What does this mean electrically? Another questionnaire, sent by ELECTRICAL WEST to power sales managers or engineers in the Western electrical utilities, revealed that *new* industrial plants will add a total of 507,646 kw of load in 1959. Another 463,032 kw of load will be added because of *existing* industrial plant expansion, and modernization. This totals to 980,678 kw, which compares with 942,820 kw added last year. Only five of the three dozen utilities queried failed to reply, so the 1959 electrical industrial load growth figure can safely be rounded off at 1,000,000 kw.

The two most encouraging facts coming from the Chambers of Commerce and the utility power sales managers are: (1) increased automation of industrial plants has doubled the kilowatt-hours per man-hour consumption of electricity in the past 10 years; (2) many of the areas reporting, large and small alike, feel that Western industrial growth is still in its infancy.

For example, the San Diego Chamber of Commerce sponsored a business outlook conference last June, at which leaders in the county's seven basic income-producing industries prognosticated the future in their industrial fields. Indications are that employment in mid-1959 will climb to an all-time high of 282,000 persons, and that about 75,000 of these will be employed in manufacturing plants.

Phoenix reports on such industries as Goodyear Aircraft, AiResearch, Reynolds Metals, General Electric Computer Division, Cannon Electric, Sperry-Phoenix (a division of Sperry-Rand), Motorola, Western Rolling Mills (a division of Yuba Consolidated Industries)—all of which have not only located in the West but which have repeatedly expanded. Phoenix planners estimate a county population of more than 800,000 by 1956 and about 25,000 new manufacturing jobs.

Albuquerque, N. M., a "beginner," relatively speaking, in industrial growth, already boasts such names as Integrated Dynamics Division of Globe Industries, Ideal Cement Co., Intermountain Instruments Inc. (purchased in February by Curtis Wright Corp.), Sandia Laboratories of the AEC and others.

The Weber County Industrial Bureau, reporting for Ogden, Utah, reports that Marquardt Aircraft Co. increased empoyment during 1958 from 667 to more than 1,200, and expects to have 2,000 employed by 1960.

Colorado Springs boasts such residents as Kaman Aircraft Corp., Emerson-Western Co., a subsidiary of Emerson Electric Mfg. Co., Timken Roller Bearing Co., Clifton Precision Products Co. and about two dozen companies maintaining offices and representatives just to maintain liaison or duty with the North American Defense Command.

Naturally, other major population centers report on industrial growth with the same enthusiasm.

An outstanding characteristic of Western industry is that it is rapidly changing. Advancing technology and the ever-increasing need for more production per man-hour makes modernization one of the most consistent electrical markets. Plants that were new a few years ago suddenly need more and cheaper production. Invariably, when modernization is required, the electrical load goes up.

This need for plant modernization stands as a challenge to the sales ability of virtually every segment of the Western electrical industry. Read "Inadequate Systems—Gamble or Calculated Risk?" on p 61, a strong story for modernizing the right way.

Systems Need Flexibility for Future

C. L. Phillips, Electrical Engineer, General Electric Co.

TAKE a look at the important role played by today's industrial distribution system. It is estimated that producer goods and raw material industries use about half the kilowatt-hours generated in the U. S. In 1958, these industries purchased or generated about 300 billion kwh of energy. Further, load growth curves prepared by many and varied interests indicate this energy requirement will be doubled in the next 10 years or less.

The year 1968 will see the gross national product of these industries rise some 40%. Population growth curves indicate there will be only 8% more workers; and probably these workers will devote less than 40 hours a week of their time to do the job.

Obviously some factor must lengthen the producing arm of the average worker. This factor is kilowatt-hours – about 70% more kilowatt-hours per worker will be required in 1968. This promptly focuses attention on the industrial distribution system.

Industry Lifeline

If each worker will require 70% more kwh, the system that transports these kilowatt-hours from the source to the worker will become increasingly vital. Engineers are studying it continuously, assiduously and carefully. They know the industrial system must be reliable because a failure to transport kilowatt-hours is invariably translated into financial loss. Also, continuity, an expensive form of reliability, has recently become most important, and for the same reason, to the large industrial.

Further, the initial system cost should be reasonable. The word "reasonable" is used because everyone is cost conscious and, all too often during the design of an industrial system, the edict is handed down to "keep the cost to a minimum." No one wants more capital expense than is reasonable, but no knowledgeable principal really means this quotation when it comes to the industrial distribution system, because it represents only 2-5% of plant cost. A drastic and hazardous minimizing of a system would at best represent less than 1% of the plant cost, yet seriously jeopardize the other 95-98% of the capital investment.

Know the Need

These decisions involving economy become a matter of trained, experienced judgment. There is no real shortage of trained engineers capable of analyzing decisions in this area. The principal should use caution in imposing a too severe discipline of cost on the system designer; likewise, the engineer, cognizant of his responsibility to the principal's pocketbook, should occasionally back off from the trees to better appreciate the forest.

Some of the problems faced in transporting in 10 years 70% more kilowatt-hours per worker deserve attention. This requirement cannot be met in one jump, but must progress by adding and subtracting to present systems, and always at reasonable minimum expense.

The evolution calls for system flexibility to meet the future's challenge. It's like an expensive race car: owning such a vehicle means, of course, an expensive clutch must be bought and paid for to enable the driver not only to keep up but shift gears as the race may require.

System Trends

Today, engineers design systems and equipments to facilitate change at each voltage level. The bus itself is the point of change. But more than bus configuration will change. Here are a few trends:

1. The voltage level at which industrials purchase power is strongly up. Services at 115 kv are not uncommon, and many more are at 12 kv.
2. Transformer kva size is up. The largest industrials are talking up to 30 mva in multiple feeds. The most popular load center size rose from 500 kva to 1,000 kva in about five years.
3. Medium voltage distribution level is up strongly, particularly growing in popularity is 12 kv; 2.4 kv is now largely confined to the smaller industrial taking power from the utility at 2.4 kv, and localized systems within the larger industrial system.
4. Motor voltage by horsepower is fairly well fixed now. Known, now, is where to put a given size motor, and any general change will probably be related to price.
5. There will be more modernization of industrial systems—just to keep up with the accelerating pace of the race.
6. There will be less industrial generation percentagewise. This percentage of their requirement dropped from 41% in 1940 to 28% in 1956. It's even lower now, and usually confined to situations involving process steam.
7. There will be higher demands on the utilities for greater reliability. Automation of utilization equipment in industrials will bring the utilities one of their most difficult problems—a strident demand for near-perfect continuity. The industrial will be spending large sums for continuity in his own system and will be expecting the same of the utility.
8. Industrial systems will become simpler, relying on quality equipment easily altered for satisfactory service and flexibility.
9. Protective device coordination and grounding practice will become better known, quite stylized and of better quality. The same applies for power factor control and transient voltage insulation protection.

The drivers in today's racing economy must buy and pay for flexibility in their distribution systems that they may shift gears in their corporate vehicle—or else forfeit the race.

An Example

Here is an example of an industrial distribution system illustrating some of the things mentioned and some of the hardware.

Fig. 1 shows a fairly large modern industrial distribution system with good flexibility for expansion. A utility delivers two sources at high voltage. A large plant expansion, involving 10 to 30 mva of power, would result in an extension of the high-voltage bus; and this can be done readily because the designer anticipates the possibility and provides for it.

Distribution within the current plant is made at the highest practical medium voltage. This happens to be a combination of secondary selective and radial, but it could be primary selective if the circumstances warranted. Spot network, loop feed and ring bus are other less popular alternatives. They are less popular primarily because of cost and relative inflexibility. With radial or primary selective feeders, a small plant or section expansion, involving one to 10 mva, is readily achieved by an extension of the medium-voltage bus.

Next, downstream, is the power unitizing concept utilizing what has come to be called the load center system. Again, they are shown radially fed, but they could be fed by a primary selective system if the additional expense is warranted. If another 500 to 1,500 kva of load is to be added, these feeders can be easily extended.

While considering this medium-voltage system, note the provision for large motors. Such motors, representing important processes, are carefully located at the proper voltage levels on readily expandable buses.

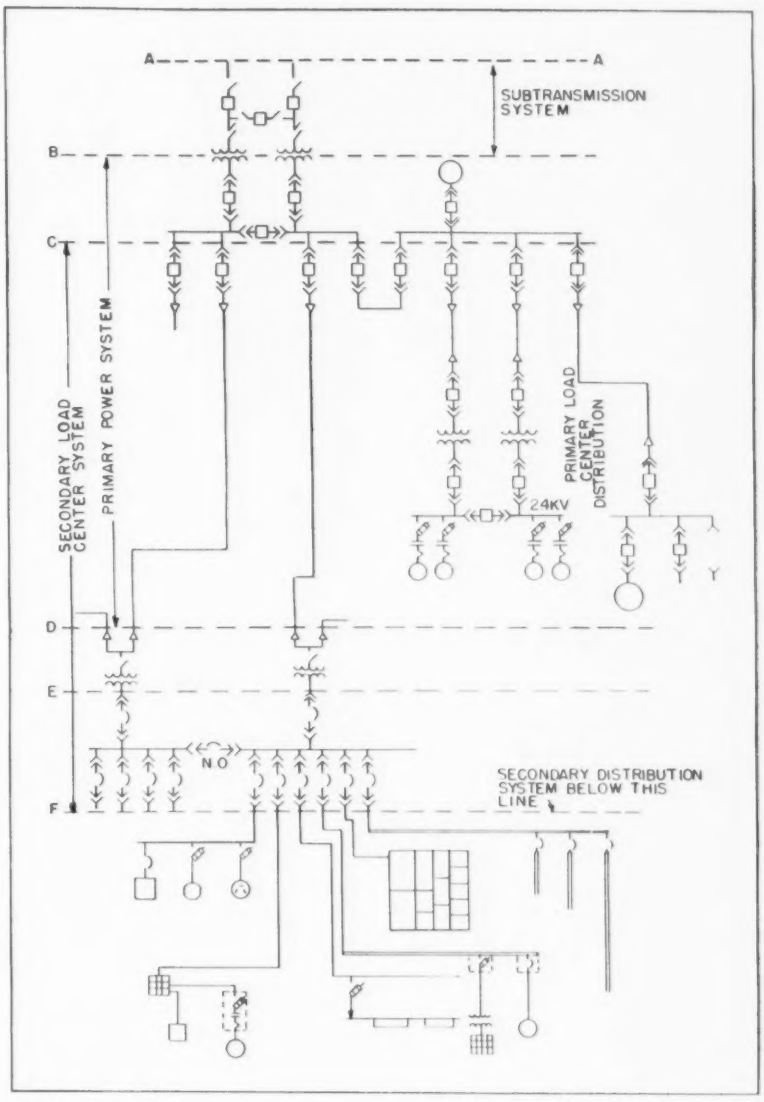


Fig. 1

A Choice of Systems

An integral part of the load center concept is the low-voltage bus. The same philosophy applicable at the high- and medium-voltage level is applicable at low voltage. Again, a radial secondary selective or other system can be used as the plant process indicates. By far the most popular voltage and system in industry are those mentioned, radial and secondary selective, at 480 v. Flexibility is achieved primarily by adding to or subtracting from a convenient bus. Cable taps, disconnects, remote switch boxes, etc., are, in general, avoided.

At the 480-v level, most systems feed loads radially, looping where necessary. A multiplicity of equipments are available here to see that the worker has ample kilowatts available to him. Because this part of the system is handling smaller pieces of load, and is next to the utilization equipment, it is constantly changing. Here flexibility is critical and most equipment designed today is designed with future change in mind.

From all this evolves a pattern. We know now that change is a certainty for industrial distribution systems. The past 15 years have seen most of this change in the form of growth; but, growth or not, flexibility is now a built-in characteristic not only in the equipment used but even the system design.

A Way of Life

Flexibility to the industrial system designer is a way of life—a state of mind. Flexibility is only one of many rules to the game, and none must be slighted. While jealously guarding his principal's pocketbook, he must be equally jealous of his own engineering integrity. He is not dealing with small values. An error in judgment or a compromise with necessary value can produce chaos.

The need for increased electrical system continuity and stability in multistoried buildings requires the engineer to be more aware of causes that disrupt the electrical distribution and design techniques to minimize these failures. One answer . . .

Secondary Network Systems

Kenward S. Oliphant

Consulting Engineer, San Francisco

Electrical contractor on American Trust building is Radelfinger Bros., San Francisco

MODERN multistoried building electrical systems have become so diversified that, in addition to the normal lighting load and the power requirement for the actual building service equipment, many new loads are now quite commonly used. Principal among these new loads is the entry of the electronic data processing machines, which are becoming quite common with large baking firms, insurance companies and larger corporate structures. Along with this equipment are many forms of auxiliary business machines which are used to correlate and feed the required data into the electronic data processing machines.

Other new loads are the various forms of reproducing records and statistics, and of course there are a multitude of communication systems which are interwoven with the building structure and which, in some instances, require outside connections through the facilities of the telephone company and wire services.

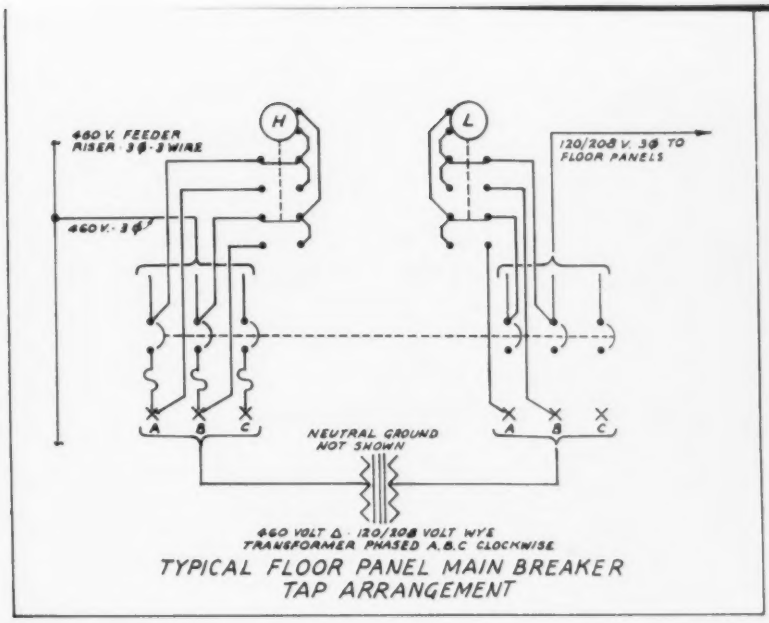
These loads, because of their economic use as labor saving devices that perform the work of many individuals and save considerable time, have developed a need for a dependable and failure-free electrical distribution system within the modern multistoried building.

To aid the description of one feature of service continuity, that being an adequate primary and secondary network system all based on the 600-v and below category, certain features of the design of the recently constructed American Trust Company office building located in San Francisco can serve as an example.

The consulting architect, Harry A. Thomsen Jr., and the architectural firm of Ashley Keyser & Runge, stressed the need for exceptional service continuity to be provided the American Trust Company, particularly in view of the fact that the electrical energy supplied by the Pacific Gas and Electric Co. would be at the newly available voltage of 460/265 v taken from a localized spot network system.

Use of the 460-v service creates many problems in trying to provide the complete service continuity required for the 120/208-v loads so commonly found in commercial buildings. Obviously, the need for transformer stepdown of voltage can not be eliminated and, codewise, the dry-type transformer is the only economical form of transformation that can be suitably adapted to multistoried buildings. With the insertion of a new possible area of failure to disrupt the normal service, it was deemed necessary to provide a secondary network interconnection between the secondary sides of the stepdown transformers.

As 460-v service connections in San Francisco are still in the minority, considerable pioneering in the full development and usage of this voltage is necessary. There were many hurdles and obstacles that presented themselves during the initial phases of designing a suitable secondary network system from the 460-v service. One principle criterion is that the system must be acceptable to all governing agencies; another is that it be economical. To satisfy the first, many items had to be clarified with the city and county of San Francisco and also with the State of California. These agencies gave considerable thought to the merits of the system, felt that it was noteworthy, and then evaluated the requirements that would assure the safety of all personnel working with and near this equipment. The following key items were integrated as part of this over-all secondary design system to satisfy the various codes and interpretations set forth.



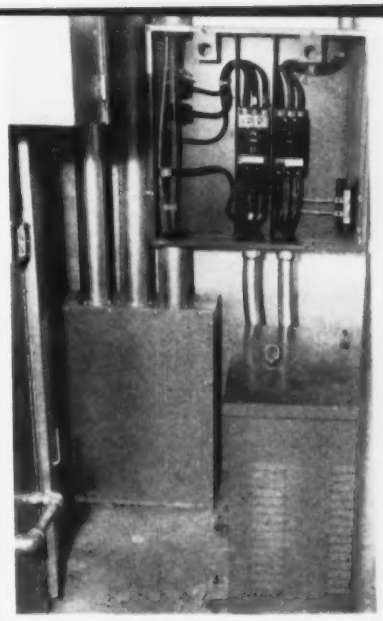


Fig. 1 — Transformer at right is specially soundproofed because of the close proximity of transformer room to offices.

Tie bars between the primary and secondary breakers isolating the transformer.

Suitable lock-off devices on all breakers serving the load.

Push-to-test pilot lights to identify the source of energy supplying the load.

Pilot lights on 460-v systems must be provided with transformers stepping the voltage down to low-voltage classification.

Pilot lights and breakers should be properly affixed with the appropriate name plates.

PG and E, as previously mentioned, serves the building at the voltage of 460/265 from a street vault containing three 1,000-kva transformer units. In this particular area the maximum vault current is 66,700 amp. Power is taken from the PG and E vault through a current limiting bus wherein proper protection is afforded the 12 feeders supplying power to the building. A typical feader, comprised of three 500 mcm cables in 4-in. conduit, for the floor circuits and requiring the stepdown in voltage from 460 to 120 v is protected by a 400-amp air circuit breaker. Such a feeder serves six floors. The possible fault current on the feeder at the first floor is 28,000 amp; at the sixth floor, 21,000 amp. A similar feeder supplies the 12th floor, and the computed fault current was found on this feeder to be 16,500 amp at the 12th-floor tap.

Figs. 1 and 2 show the wiring arrangement for 460-v primary and 120/208-v secondary building distribution networks, and a detail of the floor panel arrangement, respectively. It can readily be seen here how the overcurrent tap protection was provided from the 460-v line. The first tap is protected at 50 amp tripped through a Cordon-type circuit breaker which has current limiting fuses and is rated at 100,000 amp interrupting current. As a conventional molded case breaker is not designed to handle the available fault currents, the inclusion of this Cordon-type breaker was mandatory in the protection of the tap, both for overcurrent and fault current requirements. The breaker on the secondary side of the transformer is a molded case F-frame breaker with a trip set at 100 amp. The dash line between the two breakers (Fig. 2) indicates a mechanical tie bar with lock-off facilities so that breakers will be opened or closed together.

As a safety feature it was found desirable to incorporate the use of push-to-test pilot lights to enable the operator to determine which source of power supplying the transformer was energized. Refer to Fig. 2 for a description of the typical floor panel main breaker tap arrangement. You will note that pilot lights designated "H" for high-voltage side and pilot lights designated "L" for low-voltage side are double pole two positioned oil type devices. One set of conductors is connected to the primary side of the Cordon breaker, and the other set from the high-voltage pilot light is connected to the load terminals of the same Cordon breaker. The line side terminals are connected to the normal position of the push-to-test pilot light, providing a constant monitor on the 460-v feeder riser as a check on the A and B phase fuses. Pushing the push-to-test pilot light will de-energize the pilot from the primary side and transfer it to the load side of the Cordon breaker, thus monitoring the functioning of the A and B current limiting fuses.

The low-voltage pilot light is perhaps more significant in assisting the operator to know from which source the power is being supplied to the 120/208-v three-phase floor panels. Here again, one pair of contacts is connected to the line side, which is a transformer side of the low voltage breaker, and the other set is connected to the load side or the side which is on the outgoing terminals to the floor panels. Normal position here is on the load side, and by opening the high breaker it would be easy to ascertain that power was supplied on the 120/208-v feeder from sources other than this particular transformer tap.

Referring once again to Fig. 1 to further describe the multiple feeder ties provided for each typical floor panel, one can see that the normal floor tap serves the panelboard through a 100-amp trip breaker, designated as "Breaker A." However, it should be pointed out that there are two other sources which might energize this panel either independently or in parallel with Breaker A. This is "Breaker B" which is connected to the distribution system of the floor above, and Breaker C which is connected to the distribution system of the floor below. Inasmuch as there are three sources of power available for this panelboard, three push-to-test pilot lights were included with the panelboard so that positive marking could be made on which of the three sources was actually supplying energy to the panelboard.

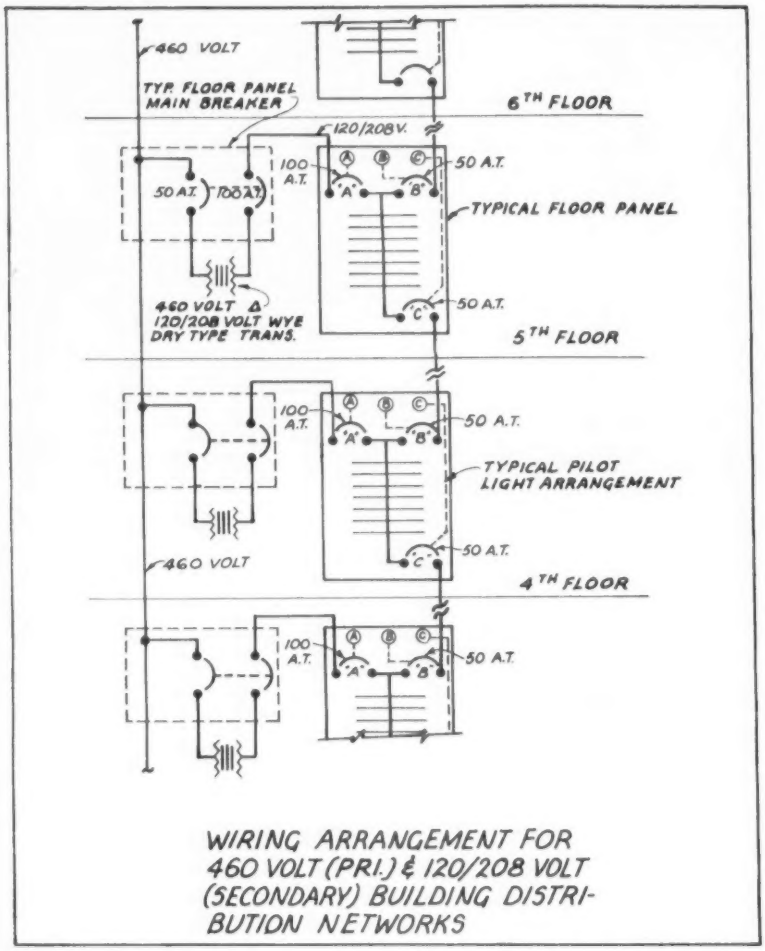


Fig. 2

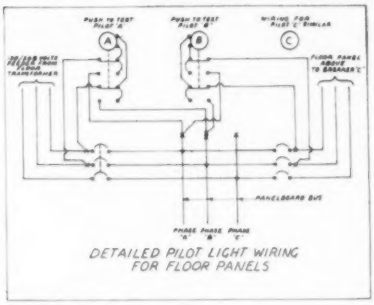


Fig. 3

Fig. 3 shows the wiring connection for pilot light wiring for floor panels. Pilot light A corresponds to the operation of Breaker A, Pilot light B corresponds to the operation of Breaker B and pilot light C corresponds to the operation of Breaker C. These panelboards are provided with a 200-amp bus and normally are 30-pole panelboards, type NA1B.

Using the devices previously described, the primary and secondary network connections are interrelated as shown in Fig. 1, designated as wiring arrangement for 460-v primary and 120/208-v secondary building distribution networks. The primary source of energy for each floor is through Breaker A of each panelboard, which is connected to the typical floor panel main breaker. However, should this source of energy be interrupted due to transformer or circuit malfunction, the respective floor panel can be operated temporarily from either or both of the adjacent floor panels, one on the floor above or the one on the floor below. This is accomplished by opening the faulted circuit floor panel main breaker. These are the breakers with the common tie bar. This isolates the primary and secondary sides of the transformer and at the option of the operator, Breaker A, located in the floor panel, may be opened for additional isolation and safety. Then Breaker C of the floor panel on the floor above is closed, and if necessary or desired, Breaker B of the floor panel on the panel of the floor below is also closed.

Referring to the floor panel whose circuit was initially interrupted, and which lost its normal source of energy, this panel can be re-energized by closing Breakers B and C, allowing current to flow to the bus from the adjacent floor panels. The pilot light arrangement is such that at a glance it can be ascertained which of the three possible sources supplies energy to the panel. Obviously, all transformer primaries and secondaries for all floors must be precisely phased together, and for the American Trust Company building, all transformers were phased in clockwise rotation, phases A, B, C.

It might also be well to point out that through the proper correlation of overcurrent protection it was possible to integrate these secondary ties together on the panelboards and never exceed the bus rating of any panelboard. Nor could the transformers be overloaded on one floor when supplying panels through the secondary network system of others.

Because of the precise phasing and the integrated overcurrent protection, it is possible when a floor is required to supply amounts of power in excess of the rating of the floor transformer, the adjacent floor panels and respective transformers can be called upon to provide added capacity by closing Breakers A, B and C and parallel feed the panel from the three sources. This increases the panel's capacity to a maximum rating of 200 amp. This added capacity results from a three-floor load diversity factor instead of the lower single-floor load diversity factor.

In summary, the following advantages are cited in behalf of this secondary network system:

The secondary network system does provide a maximum continuity of service to all floors.

A minimum outage time of approximately 90 seconds is all that is required to transfer loads.

As there rarely are three floors with identical loads and occupancy, it is possible to get a greater load diversity factor on the three floors by incorporating the secondary network system, thus enabling a smaller unit transformer load capacity to be applied for each floor.

It allows for flexibility in floor utilization at a minimum cost.

The network system requires little technical knowledge for the fast, safe transfer of loads if required by a circuit malfunction or to augment the capacity of a given floor.

Inadequate Systems . . .

Gamble or Calculated Risk?

Robert E. Thomas, Consulting Engineer, San Francisco

HOW many times do we find that people in management treat their plant's electrical system too passively because they do not realize its importance to over-all production? Nor are they aware of this until a failure occurs. These men, claiming no knowledge of their plant's electrical system, often budget insufficient funds for it when modernization takes place. This unawareness is one of the highest testimonials that can be paid to the electrical art. As the old adage, "the squeaking wheel gets the grease," fits, perhaps we should let the electrical system do a little more squeaking.

Philosophy of the engineer and contractor is not necessarily compatible with adequate design. Management's decision to make an investment in adequate engineering design and physical layout, and to take a calculated risk to improve operating position, can be nullified if complete compliance with plans and specifications is not mandatory.

By having proper plans and specifications it is possible to obtain competitive bids on the installation. Without plans and specifications, and the control thereof, management is abdicating its position and issuing carte blanche.

Building engineers and plant maintenance men are quite cognizant of present day electrical demands and would like to meet the problems presented. However, though they are often consulted, they do not actually formulate policy. On numerous occasions when an adequate electrical system has been designed and proposed, a contractor has told the policy-making authorities that if he is given the job he can reduce the cost appreciably. That is right—he can! He can cut the "guts" out of the system and "save" money. Consequently, plant engineers and maintenance men then make the inadequate installation function and management is unaware of the mistake that has been made. In too many instances this lack of proper engineering and knowledge of system requirements causes the so-called inexpensive job to turn out to be the most extravagant waste imaginable, i. e., zero times any number is still zero.

Through the experience we have gained on insurance investigations, we have become alarmingly aware of the inadequacies and dangers of numerous electrical installations.

These Paid Off

If nothing has previously convinced management of the cost of such inadequacies, perhaps the following examples will.

1. Large manufacturing concern utilizing seam and spot welding equipment.

Symptom: Inability of production equipment to maintain guaranteed output.

Problem: Low voltage.

Methods of rectification: Installation of new electrical distribution system, improvement of power factor and installation of voltage regulators.

Inherent risk: Inability of the proposed investment to pay out on the basis of increased machine productivity.

The loss of production in this plant was estimated to be $850,000 per year. Through proper engineering a new distribution system was designed and installed. The cost of the installation was approximately $36,000.

2. Metal working shop having a large number of machine tools.

Symptom: Inability to establish production standards for the machine tools.

Problem: Low voltage and high degree of voltage fluctuation.

Methods of rectification: New distribution system, power factor improvement, voltage regulators and adequate transformer capacity.

Inherent risk: Inability of the machine tools to maintain the rate of production as stated by their manufacturer. Inadequately sized machine tools.

The estimated value of loss of production was approximately $1,350,000 annually. A new distribution system was installed, transformer capacity increased, voltage regulators installed. Total cost of installation: $75,000.

Our files contain many more examples; however, space precludes their enumeration. As you can readily see, a small investment in the electrical system often can return handsome profits. All plants do not suffer the same degree of electrical deficiencies; therefore, not every installation could make such an impressive return. However, based on our knowledge, we feel that through proper engineering an electrical system could be designed and installed whereby the cost of the installation could be paid for in from five to eight years. How many other places can you make your money work so profitably? To be considered, too, is the fact that the investment usually results in more productivity.

Beware of Minimums

It has been stated that Western industrial plants will add approximately 975,000 kw of electrical load this year. New plants will add about 500,000 kw and existing plants, through modernization and expansion, will add some 475,000-plus kw. Will these loads be installed on the basis of code requirements or will they be properly engineered? When we say code requirements, we mean considering the National Electrical Code, state, city and county electrical codes and safety orders as being the measure of quality rather than the minimum permissible requirements. Code or safety orders should be considered as stating what shall not be done, rather than what shall be done. When viewed in this manner, we are in a position to throw off the arbitrary bonds that have fettered the electrical industry for

so long. By proper engineering we mean:

1. Stating the problem.
2. Reviewing the symptoms.
3. Considering alternative solutions.
4. Determining the risk involved.
5. Executing the decision.

Unless we can state the problem, we have no basis for solution and may merely be trying to alleviate the symptom. There is nothing quite so futile as the correct solution for the wrong problem. In fact, such an error can be fatal. Thus stated, engineering precludes the error of a minimum installation, rather the criteria becomes what in the way of type, quality, continuity and flexibility is required to fulfill the needs of the ultimate user. This approach will assure the user of an installation whereby he can realize the optimum in performance of his facilities.

Several years ago, we were asked by a large San Francisco Bay area food processing plant to review its electrical system and to make recommendations as to methods of improvement. This installation had been made some 40 years ago. After an exhaustive field survey, we were forced to report that the installation was as good as any that could be installed today. The engineer who had designed this system showed ingenuity, imagination and farsightedness to such a degree that what is today considered the latest in design was incorporated. The president of the company told us that their controller estimated that to operate, maintain and expand their electrical system cost them approximately $750,000 less than their competitor's.

With the advent of automation and new production techniques, the use of power in relation to manhours has doubled in the past 10 years. This rate of increase does not appear to be slackening, therefore a properly designed electrical facility is a must, unless industry is satisfied to obtain less than the best capability of its equipment, suffer costly outages and excessive maintenance costs.

Shall industry recognize the situation, gather the pertinent information, weigh the alternatives, then take the calculated risk based upon knowledge — or shall it continue to gamble?

The decision must be made by policy-making officials. They must recognize that inadequate installations exist, and quit acting like Don Quixote battling the windmills — in this case the windmills being symptoms.

Solid state devices . . .

New Look in Industrial

R. A. Wise, Electrical Engineer, Bechtel Corp.

THE demand for automatic features continues to increase the complexity of modern control systems. Superimposed on these more sophisticated schemes are the requirements of greater speed, reliability, minimum maintenance, etc. While electromechanical devices have been improved to a great extent, the facts of life indicate that the problems of these old friends have not been solved but minimized to a greater or lesser degree, depending on the environment in which they are used. The advent of static switching devices, which more accurately should be called "solid state control devices," has contributed greatly to satisfying the requirements mentioned.

Solid state control is a method of electrically controlling machine functions by the use of logic elements and accessories that are not subject to wear and erosion. Logic elements perform the same functions in solid state control that relays do in conventional control. Relays convert a single imput to a coil into various outputs by means of a moving armature closing or opening contacts. Solid state control logic elements convert a combination of inputs into a single output by controlling the impedance of an output coil on a magnetic core, or by the use of semiconductors.

Two factors might tend to discourage the use of the latter devices: first, in some control schemes the cost of solid state devices may be higher than an equivalent electromechanical system; second, the input equipment is usually mechanical and probably not as reliable as the solid state device. Therefore, why make the investment? A continuing increase in the use of these devices in almost all branches of control indicates that even the first reason has less importance and that the second is not valid because, in the event of possible failure of the control systems, the trouble spots can be located and repaired or replaced more quickly.

Control systems fall generally into two groups. The first, as an example: a system of conveyors in series order, i. e., conveyor 1 to start then 2-3; and in shutdown 1 to stop and all others run to unload the conveyors. If to the first system we add the requirements that after N units have been loaded they shall be moved and shunted to 1 of X branches, we have added two additional requirements — (1) sensing and (2) decision-making—to the common denominator of both systems: moving material.

In the first system it is unlikely that solid state control would be an economic choice, but in the second system we begin to see the need for dependable decision-making hardware. If there is added to a second system a requirement that it sort, find an empty branch, or increase the speed (or all three), the number of inputs have multiplied and the real time for decision and action has decreased. In general, as the number of inputs increase, inferring more logic in the decision section, the direction is toward solid state control devices.

The engineering required for the design of solid state control systems is in no way more difficult than an electromechanical system. The first attempt will, of course, necessitate gaining a familiarity with the new form. There is a wealth of published material on logic design technique that is equally appropriate for switching or solid state circuitry, and no attempt will be made to retrace this work. It is the author's opinion that in the practical design of systems, the "horse sense" approach will probably be of the greatest value. Examination shows that the most complicated circuits consist of surprisingly short strings of logic which, in turn, provide inputs to other similar logic chains.

The design of these logic strings is accomplished with greater ease when considered on a basis of the function of each element, and can be implemented with functional shorthand. An "or," for example, can be drawn faster in the "talking paper" stage than the equivalent relay contacts and solenoid. The whole system can be delineated in a one-line form, so that nontechnical people can understand the scheme.

When the first schematic is completed that satisfies the conditions

Control

of the control philosophy, an investigation for redundancy will probably turn up shortcuts to the desired result. As the engineer acquires proficiency in thinking in functional terms, his designs will in turn become cleaner.

The greatest contributors to increased cost in a solid state system are probably the output units. There is no rule of thumb that can be applied that will tell the designer whether he must use a static device, or whether he can use a relay that is operated by a logic element. If a general statement can be made, it would be: if a particular system can tolerate an output error without contributing to errors in subsequent logic or action, the use of a cheaper but less reliable output relay may be indicated. If this is not the case, then the more reliable solid state output equipment should be used. To the cost of a solid state system must also be added one or more special power supplies. Even the most basic saturable reactor system will require a d-c source.

Solid state systems presently marketed use semiconductor diodes or rectifiers only, magnetic amplifiers or pulsed magnetic amplifiers. No attempt will be made to establish relative values between each type. However, they have in common reliability, due to conservatively rated components from which they are assembled. Unlike the electromechanical relay, whose life is measured in number of operations, solid state devices are unaffected by operations.

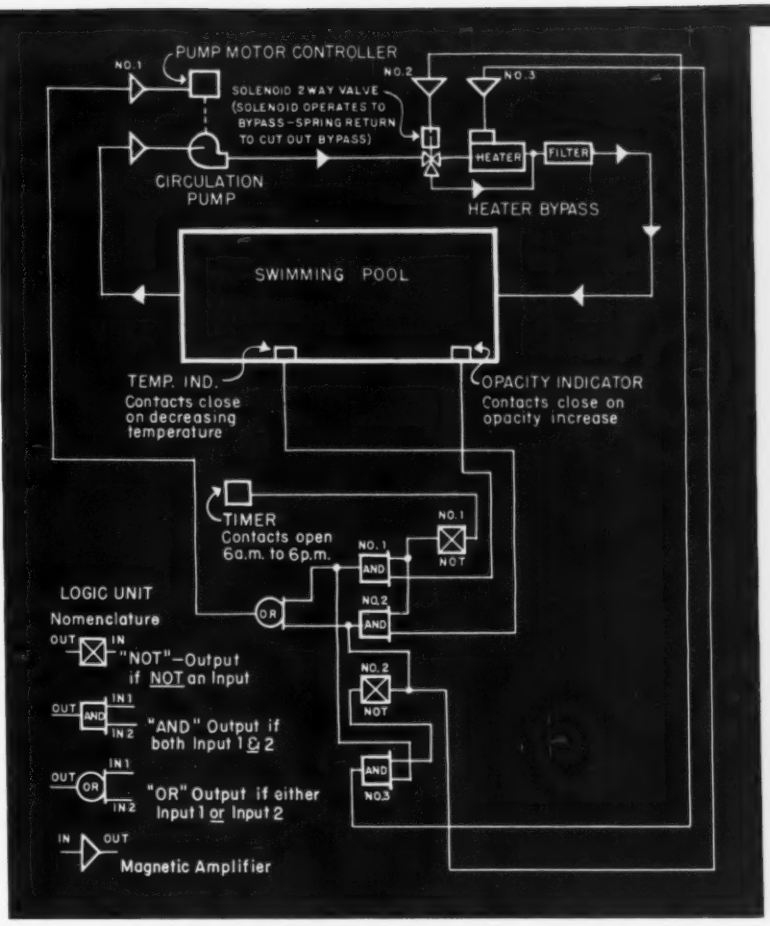
Month after month more hardware is available for use as intermediate stages that can provide compatible interconnections to computers, tape or card input systems, etc. The machine tool designers seem to have led the way in applying these devices and in using punched cards or tape to program their machines.

Counters that will follow the rate of the telephone dialing systems may be constructed with these elements. There is on the market a photoelectric code reading device that can provide sorting. It is suggested that a combination of counting and sorting could provide logic warehousing systems, and provide input data to an accounting computer as well.

Logic systems have been constructed that will take input from power or current sensing devices and logically decide and provide load programming, or sensing overload will shed load in a logical predetermined order.

Because of their low input power requirements and high signal to noise ratio, they lend themselves to remote operation over relatively long distances. With the possible exception of semiconductor types, these devices are quite insensitive to environment. The absence of moving contacts indicates more simple and less expensive wiring methods in hazardous locations. Existing pulse operated motors for valve positioning and position indication suggest that solid state logic devices could be applied to process or mixing control.

Future development in power semiconductors and magnetic amplifiers will probably bring self-contained, logic directed motor control and power switching with attendant simplicity and flexibility in plant distribution systems.



Solid State Control of Pool Heater—Filter

CONDITION:

1. When temperature decreases, heater and circulation pump runs and flow is through filter.

2. If opacity is high and temperature is normal, circulation pump to run, heater off and heater by-pass open.

3. If temperature is low and opacity high, by-pass is closed, circulation pump runs, and heater is on.

4. After 6 p.m., all control is locked out by timer until 6 a.m.

OPERATION:

Timer locks out control through Not No. 1 to And No. 1 and No. 2 during night hours. Input to And No. 1 is provided by Not No. 1 and opacity indicator. If during daytime opacity is high, an output is provided, which through Or unit starts circulation pump through And unit No. 3 operates by-pass valve around heater. If temperature is normal, no output is available from And No. 2, therefore Not No. 2 has an output permitting the action above.

If timer permits and temperature is low, both inputs to And No. 2 are provided, and through Or unit and magnetic And No. 1, circulation pump is started; through magnetic amplifier No. 3 heater is started. An input to Not No. 2 removes one input from And No. 3 so that solenoid valve spring return closes by-pass and flow is through venter and filter.

Geothermal Power —

Blowing fist-sized chunks of rock 300 ft in the air, a new well comes in at the geyser site in northern California

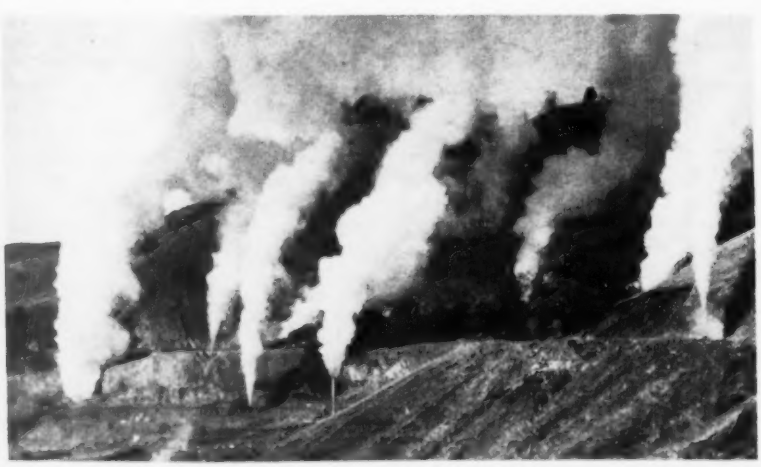
At the time of creation the molten earth contained a reserve of heat energy in an amount that only the elemental forces of creation could generate. About 10% of the molten earth was water vapor. As the earth cooled, the elementary magma (the molten core) has crystallized into primary rock, a solid shell to a thickness of 20 miles. With the cooling has come the contraction that has created the continents, the mountains and valleys. With the loss of its original heat and consequent crystalization, the rocks have yielded most of their original moisture content in the form of magmatic steam. Geological calculations tend to confirm the fact that condensation of magmatic steam through the geologic ages has released a sufficient volume of water to create the oceans and surface waters of our globe.

On a geological time base the earth's outer shell is in constant motion, faulting and fracturing as the surface continues to lose heat. With these shifts, the magma, at temperatures in excess of 3,000 F, flows to the surface. This results in a volcano or a tongue of molten lava lurking near the surface of the earth. As the magma crystallizes, the magmatic steam is squeezed to the earth's surface, where it contacts surface water, which is flashed into steam. Experience has proved that drilling toward the source of the steam reduces the resistance of the steam's movement to the earth's surface, and thereby increases its pressure and heat content.

History of Geothermal Power

The practical use of geothermal steam was first undertaken near the town of Larderello, Italy, where engineers began using earth steam to evaporate condensate to obtain boric acid and subsequently for the generation of electricity. By 1916, Larderello generators had a capacity of 9,000 kw.

Electric generation facilities increased steadily over the years, and today have a capacity of 270,000 kw. Steam wells at Larderello reach a depth in excess of 3,000 ft. Italian scientists have determined that the active magma at Larderello is about two miles below the surface. Based on this finding, they estimate that *the present rate of energy withdrawal can be maintained for a period of* 11,000 *years.*



ALL TOGETHER NOW—the existing steam wells roar a 130-db chorus of potential power

Curiosity or Sleeping Giant?

The increasing demand for electric power, and the recognized limit of the hydroelectric supply in New Zealand, prompted the New Zealand government, as well as private groups, to begin bore prospecting in the Wairakei area in 1949. Today's generation in New Zealand is 69,000 kw. Estimates of the full development of the Wairakei field indicate a continuing power yield between 150,000 and 400,000 kw.

The Mexican government has recently ordered turbine equipment to make use of large quantities of steam recently discovered in the state of Hidalgo. The government of Iceland has undertaken a program of deep drilling of areas in its country that have long been used as a source of domestic heat.

The California Geysers

The California geysers were discovered in 1847 by William Elliott, who was hunting grizzly bears in the rugged terrain between Cloverdale and Calistoga. The geysers remained a natural curiosity until 1921, when a group of local businessmen—including the world-renowned Luther Burbank—drilled some shallow wells to determine the volume of flow. There was talk of development at that time, but the glut of gas, oil and hydro in California diluted interest in the project. No one could state with assurance that there would continue to be steam. They still can't.

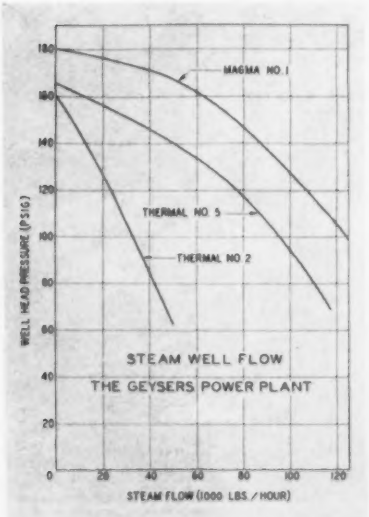
The faith of the pioneer developers has been justified, for the wells have produced with undiminished vigor for more than 35 years. Untold millions of dollars in potential energy have been dissipated through the years.

Since the efforts of the 1920s, the geysers area (actually they are fumaroles, not geysers) has been repeatedly examined by geologists of national repute. Surface conditions indicate the development of a fissure about 1,000 ft wide which ages ago allowed the magma to near the surface.

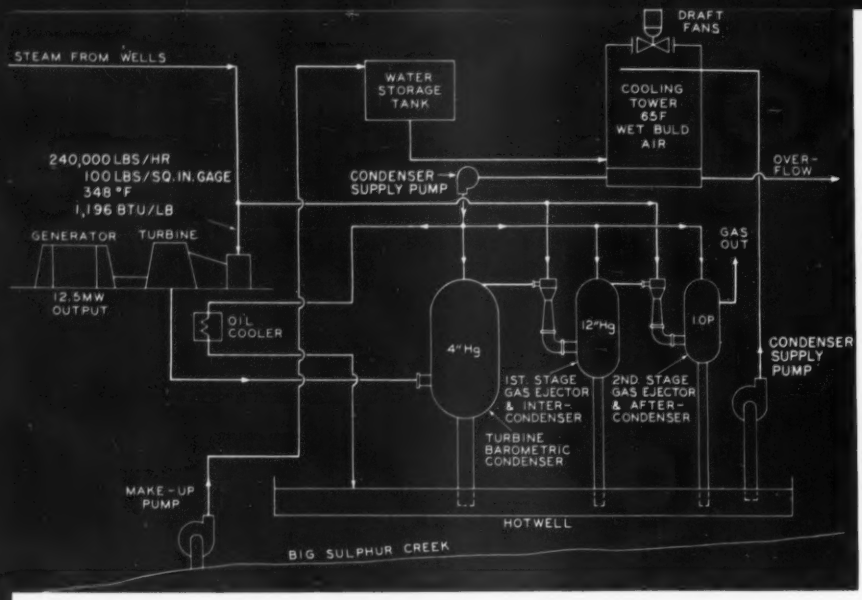
The property has the length of about five miles, along which distance there are five active fumaroles.

In 1955, the Magma Power Co. obtained an exclusive lease to 3,200 acres of land and drilled a single well. In 1956, the Magma Power Co. made an agreement with the newly formed Thermal Power Co. to share the development of the area, providing the Thermal Power Co. would drill additional wells in an effort to determine the effects of additional wells on the production of Magma No. 1. Thermal Power Co. drilled five wells during 1957, one of which caused a section of the hill to blow out and another of which was abandoned.

Drilling for steam is both difficult and hazardous because of the high temperature of the earth in the area. To control the temperature of the drilling bits, great quantities of water must be continuously pumped into the well. The thermal wells were drilled from 500 to 1,400 ft. The temperature of the rock was measured at 600 ft and determined to be 600 F. On the basis of flow tests made by Thermal Power Co. on



Ears plugged against the deafening roar PG and E test engineers measure steam properties. Typical flows shown above



Block diagram of the geysers cycle shows how the freedom from steam generation facilities simplifies the power plant

Magma No. 1 and Thermal Nos. 1, 2 and 5 wells, approaches were made to Pacific Gas and Electric Co. which culminated in PG and E's program to make an initial development of 12,500 kw, with an obligation to add additional capacity as Thermal was able to develop the steam. PG and E pays Thermal 2½ mills per net kilowatt-hour, with some provision for future escalation.

The PG and E Plant

While a geothermal plant is much less complicated than a conventional steam plant because of the absence of fuel handling and steam generating facilities and auxiliaries, there are some additional complications resulting from the character of the steam. Initial studies of the steam flow (see table) indicated turbine throttle conditions of 100 psig, 348 F with an enthalpy of 1,200. A second serious consideration was the chemical composition of the steam. It was determined that about 0.75% by weight of the steam was noncondensable gases. These steam conditions are unfavorable by present standards, but considerably better than those experienced at geothermal installations elsewhere in the world. In order to determine the corrosive properties of these gases, test setups were made with a Corrosometer for the various conditions found in the steam cycle. Samples of carbon steel, types 410, 304 and 316 stainless steel, were tested so that the lowest-cost material that would perform adequately could be specified. The 316 stainless steel proved to be the most satisfactory of the stainless steels. Carbon steel proved to be unsatisfactory in each case. The condensers, gas ejectors and critical pump parts were specified to be 316 stainless.

The Steam Cycle

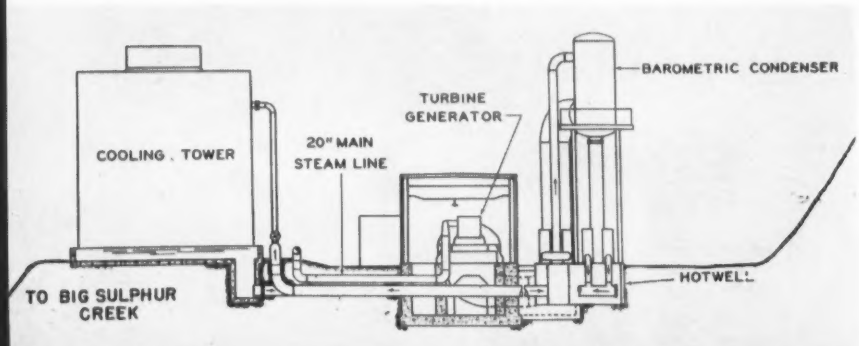
PG and E was fortunate in having available a 12,500-kw turbine-generator unit, vintage 1924, which could be modified for the geothermal plant. The turbine is a General Electric nine stage, 1,800 rpm, single casing, condensing unit designed for inlet conditions of 175 psig with 100 F superheat and 1½ in. Hg absolute exhaust pressure. The turbine will be modified by opening up the steam passages. The control valves will be replaced by two 12-in. butterfly valves and the first three stages will be removed. The remaining six diaphragms will be replaced because it is believed the copper brazing in the original construction would be attacked by the hydrogen sulfide in the steam. The eighth and ninth stage buckets will be modified to increase the flow, and will be constructed of 11-13% chrome steel. The diaphragms of the eighth and ninth stages will also be enlarged to permit more steam flow. It is expected that there will be fine mineral matter in the steam, which might cause the stem of the turbine throttle valve to stick. For this reason an emergency stop valve of the butterfly type will be installed ahead of the throttle valve. Simultaneous tripping of the two valves will insure positive stopping of the steam flow. Schematics of the steam cycle as well as physical layout are attached.

Because of the fact that the steam condensate does not go back into the cycle, it is possible to use a less expensive barometric condenser. In a barometric condenser, the condensing steam and the cooling water mix as they fall down a barometric leg into a hot well. From the hot well the water is pumped to a cooling tower and cooled by evaporation. The water supplied by the condensing steam is greater than the loss by evaporation in the cooling towers, providing a system that requires no makeup water. The large quantity of noncondensable gases will require special handling, as indicated in the box diagram. Instead of exhausting the gas and steam mixture from the second-stage gas ejector into the atmosphere, an aftercondenser will be provided so the amount of contaminated moisture ejected will be reduced.

The Electrical System

The electrical output of The Geysers plant will be delivered to the system over a 60-kv, wood-pole transmission tap. This 60-kv tap will have a capacity of 34,000 kva, sufficient for another small unit. If additional capacity develops, the plan is to tie to PG and E's 110-kv system.

The Geysers plant will be unattended. Two levels of alarm will be transmitted to the nearby Fulton substation. One indicates a dangerous condition that has caused the unit to shut itself down. The other



A probable cross section of the U. S.'s first geothermal power station to be developed by PG and E at The Geysers, Calif.

indicator signals an abnormal but not dangerous condition. In either case, a trouble man will be dispatched since there is no provision for automatic restart.

Geothermal's Future

Students of the subject are pointing with increasing alarm to the fact that at the present rate of use our domestic supplies of oil and gas will be perilously short in 25 years. New finds and foreign imports tend to set this date back—but how much, nobody knows. In the mountain states and the Pacific Northwest, brown coal will become of increasing importance, and of course atomic power is becoming a factor.

Our fossil fuels, representing a form of stored solar energy, are being regarded more and more as important petrochemical reserves. It is certainly true that they are finite and irreplaceable.

In contrast, *our geothermal reserve (the heat of the earth's core) is many millions of times* that of gas, oil and coal combined. There has been little study to determine how many hot springs, geysers and fumaroles can be converted into producing geothermal properties, with proper drilling. It is possible that a large share of the requirement for fossil fuels as a heat source could be taken by the geothermal reserves—and economically, too. No one knows with certainty whether The Geysers wells will flow tomorrow. From a purely logical point of view, there is as much reason to believe that there is another 200,000 kw available at The Geysers site as there is to anticipate an additional 20 kw. The significance of The Geysers development is this: if geothermal power is a sleeping giant, PG and E and Thermal Power Co. are determined to give him a good prod.

Portland General Electric develops . . .

Insulated Sheaves for Reconductoring

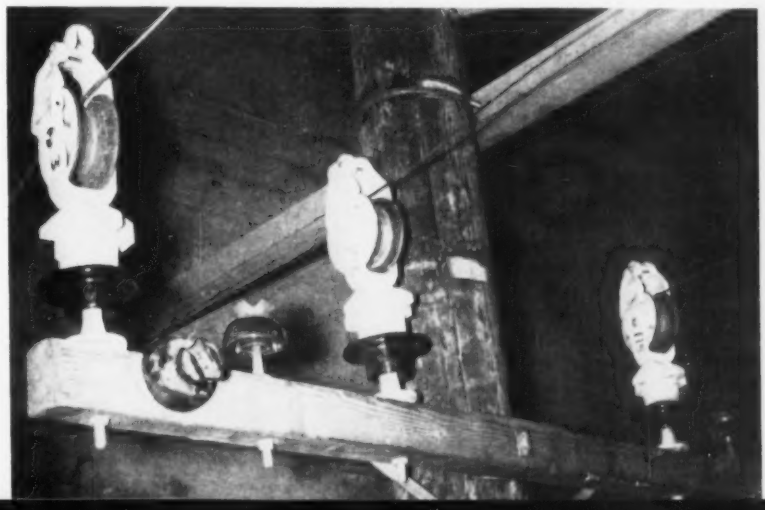
Allan T. Johnson, Chief Field Engineer, Willamette Valley Division, Portland General Electric Co.

PORTLAND General Electric Co.'s Willamette Valley division has developed a method of replacing an 11-kv line by working it from 8 a.m. to 5 p.m., and returning it to service each evening to serve a critical load. The technique was developed to replace a line that served a heating load designed to keep frost and snow off a bridge approach in Salem, Ore. The line could be taken out of service during the daytime, but had to be returned to service because of nighttime frost conditions. The 11-kv line had a 4-kv line beneath it and a 57-kv line above it. Since the 4-kv line could not be killed, it was necessary to use tension stringing equipment. In order to do the job, it was necessary to develop an insulated sheave. This was done simply by removing the crossarm bar from a standard stringing sheave and mounting it on a surplus station bus insulator which had a ¾-in. pin welded to the base.

The 11-kv line to be replaced was de-energized, and one climb was made at each pole to install the stringing sheaves and to place the de-energized lines in the sheaves. Fig. 2 shows the crossarm with one pin and insulator stored horizontally on the arm and the inside pin moved one pinhole to the outside. With this accomplished, the wire was then tied only at the dead-ends. After the stringing equipment was in place on the ground, the existing wire was cut loose at the dead-ends, attached to the pulling donkey at one end, and to the new conductor on the tension brake at the other end. Using two-way radio to coordinate tensioning, ends were made up and this process repeated for the other two conductors. An additional climb at each pole was necessary to tie in the new wire and lower the stringing sheaves.

It is estimated that this section of line was replaced in approximately one-third of the time that would have been required had the conductor been replaced with conventional methods. In addition to fewer climbs per pole, it was not necessary to install "straw" and "bull" lines due to the use of the insulated sheaves; and the tying in work could be done right up to the normal quitting time since there was no need to finish any particular phase in order to energize the line in the evening. Savings on the initial job indicate the continued use of the insulated sheaves for reconductoring three-phase 12.5 kv wye lines.

The new technique has additional advantages. Portland General Electric transfers its stringing donkeys and tension reels from division to division. Since it is possible to install the sheaves and locate the conductors with hotsticks well in advance of the actual requirement for stringing equipment, it is felt that a better use can be made of the tension stringing equipment.



Mockup of the insulated sheaves shows conductors in position—operable for evening load, but also ready for tension reconductoring with no further line work

Southern California Edison accounts for only 96 distribution items in new system to . . .

Reduce Accounting Costs

W. T. Kyle, Comptroller Department

W. J. Franklin, Distribution Division
Southern California Edison Co.

The need for reduction of costs in accounting for distribution properties has been apparent for many years. The advent of modern accounting machines presented the opportunity to effect sizable economies. Key to these savings is a distribution unit-of-property accounting system that reduces accounting costs and provides a more adequate record of distribution plant.

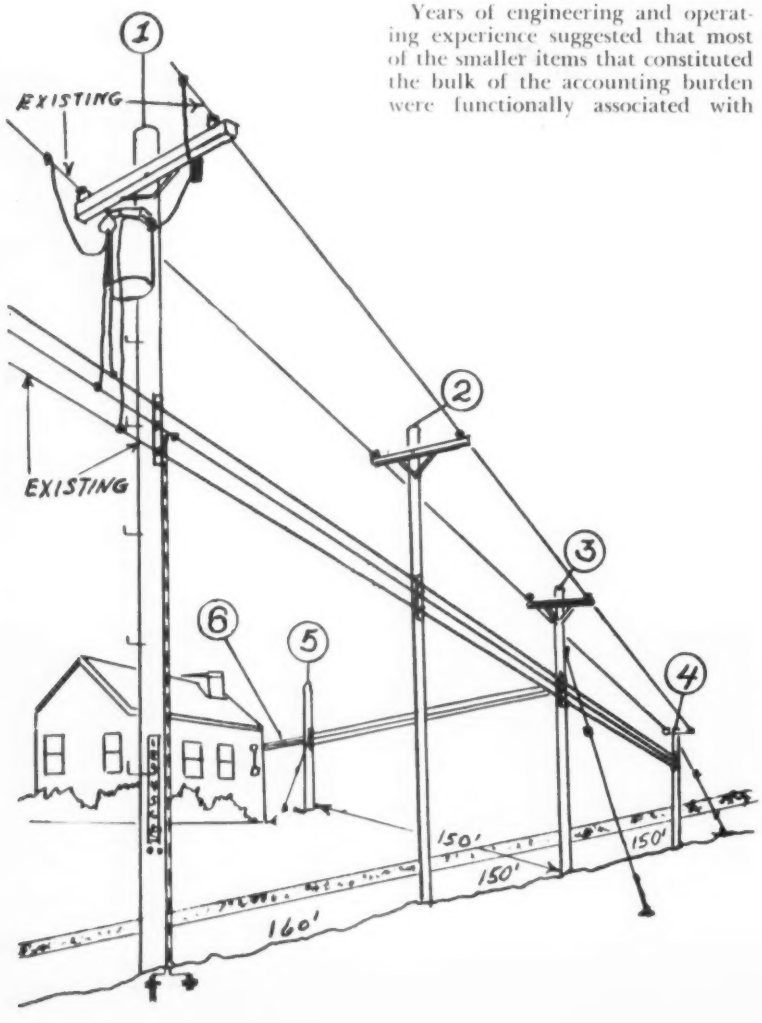
The usual practice is to account for "outside plant" units under many small, comparatively inexpensive, items of material. For example: (1) poles by length and per cent of ownership; (2) crossarms by length; (3) pins by type; (4) guys and anchors by size and type; and (5) conductors by size, kind and voltage. Accounting became a goodly portion of the installed cost of small items.

The Unit-of-Property

Years of engineering and operating experience suggested that most of the smaller items that constituted the bulk of the accounting burden were functionally associated with major units of property. Would it be possible to keep track of the major units of property only and then calculate the "load" of minor items with accounting machines? Records proved that it was possible. Hence, crossarms became a unit of property and the associated insulator pins, bolts, braces and signs were automatically accounted for based on crossarm usage.

Now there is a catalog of 96 units, where formerly the field crews were required to account separately for more than 1,600 units of material. Now 1,050 types of items are available to line crews without paper work because they are associated with the 96 units.

When the installation of a unit



How the new

The Job To Be Done

Primary and secondary existing to pole No. 1

1 - 4 Install two No. 4 ACSR, three spans 4 kv

1 - 5 Install three No. 2 WAL 120/240, one phase

1 Remove 40-ft pole and two No. 82 arms
Install 50-ft pole; one No. 99 arm; one 15 kva, 4 kv, 120/240 transformer; one No. 199 cutout

2 - 3 Install 45-ft pole and No. 99 crossarm

4 Install 45-ft pole and No. 99 crossarm double

5 Install 45-ft pole

6 Install three No. 6 WAL 120/240 services
Install one 15-amp, 240-v, one-phase meter

Field forces requisition and account for **only** the items listed on the next page in performing this extension work.

of property is reported, this activates, by mechanized accounting, all the costs that make a complete unit, such as loading of minor items, labor and such labor burdens as supervision, tool expense and pay-roll tax.

The net actual usage of minor material items, in connection with unit-of-property installations, is determined by quarterly inventories of district stores. This net usage is charged into a loading work order and is cleared to the appropriate units of property with the application of standard cost rates established by the valuation department and engineering staff. At the end of each quarterly accounting period, the balance remaining in this blanket work order is credited or debited to depreciation for salvable minor items removed from the line and returned to stock.

Labor Loaded by Machine

Labor is loaded to units-of-property at a predetermined trial labor-loading rate with mechanized accounting and is adjusted to actual labor cost when work orders are closed.

Transportation costs are not allocated to cost accounts in the field but are distributed, at predetermined rates, to labor charged to work-order cost accounts and functions.

This method of loading minor material items to units of property has reduced the number of accounting forms 50%. On the remaining forms it has eliminated the detailing of approximately 65% of material used in line construction.

This reduction in the volume and complexity of accounting procedures has naturally resulted in less clerical cost, in the field as well as in the general office.

Proved in Use

A year's experience with the unit-of-property system has indicated some by-product advantages that are proving to be most valuable.

Simplified Retirement Procedures—A retirement unit is a specific unit of property that, when retired from distribution service with or without replacement, is accounted for by crediting its predetermined book or historical cost to the appropriate distribution plant account by mechanized accounting methods. These retirement units are grouped by year bands according to year of installation.

A major aim in establishing priced units of property by original year or year bands of installation is to make the original installed cost, associated with each unit to be retired, readily available. In view of the fact that related costs are determined and recorded at the time of installation, analyses and estimates are eliminated at the time property units are retired.

A Management Tool—To be used in comparison of construction costs. Some examples:

1. Studies of service lives for various units are facilitated.
2. A valid comparison of the cost of plant constructed at different price levels is possible by adjusting original cost dollars to a constant dollar value. Unit-of-property records showing costs and years of installation permit adjustments to a standard unit of measure.
3. Cost data for specific types of units are available for use in the preparation of job estimates and budgets.

Distribution unitization is another big step in our company's continuing program of work simplification and cost reduction.

Unit-of-Property system works on the job — in the office

Material Accounting

Only A Items Reported Under New Unit of Property Method

Unit of Property Description	Unit	Unit Acct.	No. Code	Total Quantity
Pole, wood, fully owned	Each	354	33	5
Crossarm, fully owned	Each	354	25	5
Aluminum, insulated, No. 2 and smaller	Foot	355	08	1,830
Aluminum and ACSR bare No. 2 and smaller	Foot	355	10	920
Trans, without installation costs	Each	358	46	1
Cutouts, various	Each	355	28	1
Overhead service wires installation	Each	359	38	3
Meters, single phase, all sizes	Each	360	31	1

A Retirement Items Reported Under Unit of Property Method

Pole, wood, fully owned	Each	554	33	1
Crossarm, fully owned	Each	554	25	2

B Items Accounted for by Machine

Complete guy assemblies, brackets, pole steps, visibility strips, pole number plates and miscellaneous hardware loaded to poles.

Insulator pins, bolts, braces and signs are loaded to arms.

Insulators, clamps, tie wire, connectors and complete ground assembly (including conductor and cover-up pole) are loaded to (overhead) conductors.

Under the old system, A items and B items were detailed on material accounting forms requiring 59 entries. New system requires 17 entries with 42 B items loaded to associated A items by accounting machines.

Labor and Office Accounting

Reduction in Labor Distribution—**Labor cost for installing and removing units is charged to one holding account for each crew member, which is distributed by machine to appropriate units by a standard cost method.**

Under the old system, labor was distributed to various individual plant accounts for each crew member. The new system reduces the crew labor entries on time-keeping forms by 70%.

Savings in Office Accounting—**Under the new method, the volume of material accounting forms submitted by crews for processing in the office has been reduced by 65%.**

Formerly, it was necessary for each local office to determine and price the original cost of units removed. Under the new method, this is accomplished by machine.

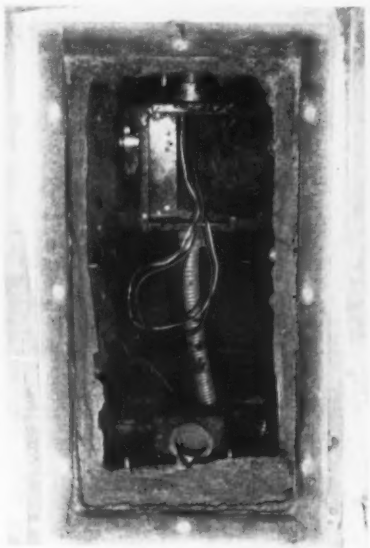
1906 building remodeled, penthouse added

In remodeling pioneer Levi Strauss building

Underfloor System

When its "after the 1906 fire" building went from overalls, as a manufacturing plant, to fashionable "Levi" dude attire, as office headquarters, Levi Strauss & Co., pioneer San Francisco garment firm, had quite an alteration on its hands. Virtually the entire lining of the 98 Battery St. building was ripped out and a new satin one substituted for the denim. To convert electrically the 50-year-old structure, yet use as much as possible of its recently installed fluorescent lighting system, was the job assigned to Quality

Floor box, cover; and flex stub adjacent



Close-up of floor port and flex supports

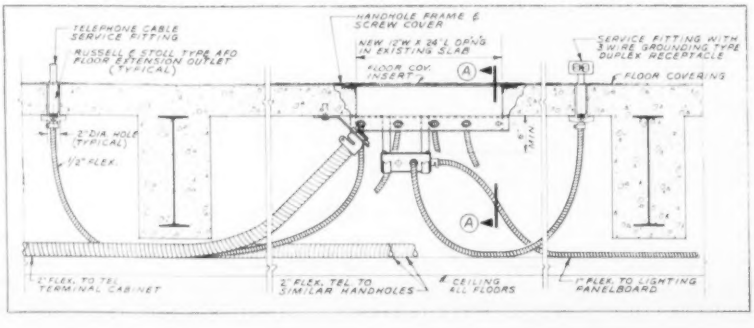
Connecting flex to floor extension fitting

How to get an underfloor system without duct was solved by cutting access holes or ports 12x24 in. in each floor in each bay. To the floor was then grouted a brass frame to hold a metal cover in which the floor covering was later inserted. In so doing, the sides of the port or manhole were made smooth. The cover plate was designed to be bolted in place for the finish. It is hardly noticeable in the finished floor yet provides access to the facilities below for making extensions to desk or equipment locations.

Under each such port a frame was fastened to the ceiling below by means of studs shot into the slab with a powder-actuated tool. This frame of steel plates and straps, best described in the pictures above and diagrams below, supports a terminal pull box for the 120-v feeder from the panelboard and the flexible metal conduit for the circuits to the floor power outlets. It also holds two terminal straps for the telephone flexible conduits, one on each side. At one end is a bracket in which the telephone feeder circuit terminates.

Wherever either or both a telephone and a power outlet are required, a hole is drilled through the floor slab with a core drill with Carbaloy drill head. A length of ¾-in. flexible conduit for telephone or ½ in. for power is fed through this hole and, because of the handhole size, is

Cross sections (A on facing page) show details of the floor port and connections


TELEPHONE CABLE SERVICE FITTING
RUSSELL & STOLL TYPE AFO FLOOR EXTENSION OUTLET (TYPICAL)
HANDHOLE FRAME & SCREW COVER
NEW 12"W X 24"L OPNG IN EXISTING SLAB
FLOOR COV. INSERT
SERVICE FITTING WITH 3-WIRE GROUNDING TYPE DUPLEX RECEPTACLE
FLOOR COVERING
2" DIA. HOLE (TYPICAL)
½" FLEX.
6" MIN.
1" FLEX. TO TEL TERMINAL CABINET
2" FLEX. TEL TO SIMILAR HANDHOLES
CEILING ALL FLOORS
1" FLEX. TO LIGHTING PANELBOARD

they provided an . . .

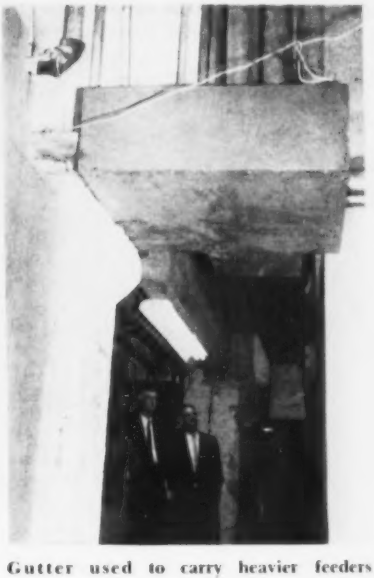
Without Duct

Electric Co. and to Bayha, Weir & Finato, consulting electrical engineers. An extensive underfloor system of telephone and office power outlets was needed but the old floor slabs would not support the added weight of a duct system concreted in place. So Frank Bayha and Robert Hardy of Quality devised a scheme pictured here, one so successful that Hardy will use it in a prestressed concrete slab installation in the east, a new building in that case. With prestressed concrete there can be no conduit in the slab.

Lighting fixtures were cleaned and reused

Extension fitting with its toggle bolt

Finished power and telephone floor outlet

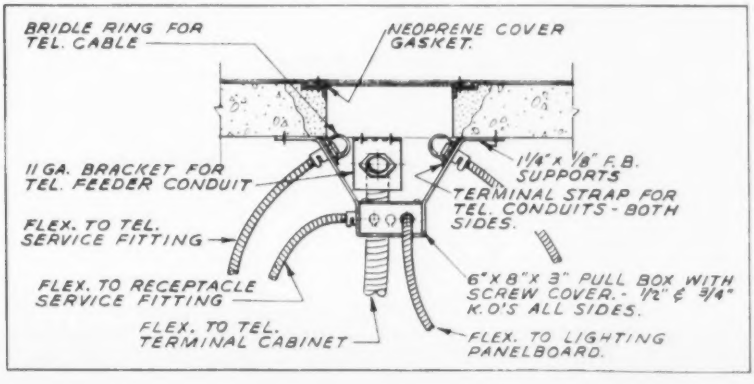


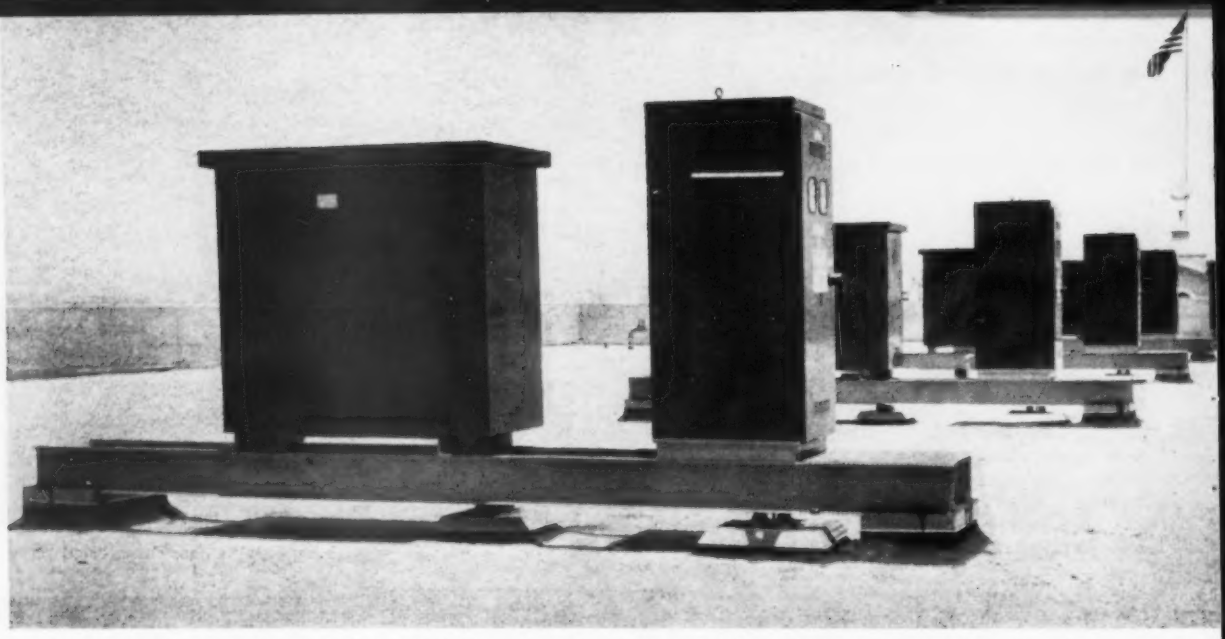
Gutter used to carry heavier feeders

easily fished over to the frame and connected to its respective fitting—the terminal strap for the telephone conduit, the pull box for the power circuit. A 1-in. flex is run from this pull box to the panel board. A 2-in. flex runs between the bracket there and the telephone terminal cabinet in a closet on each floor. All of this is concealed by the furred ceiling of the floor below just enough below the beams to allow space for the flex.

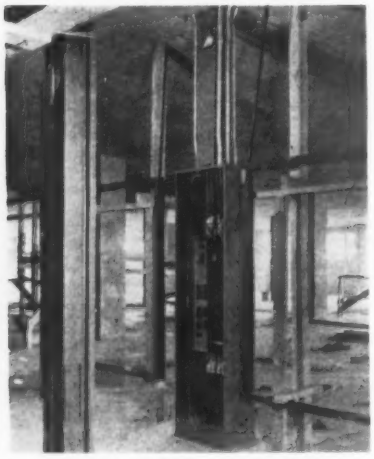
At the business end of the run of flex, a Russell & Stoll type AFO brass fitting, which is equipped with wings like a toggle bolt, is fastened to the flex by means of a flex fitting that has previously been welded to the fitting. This fitting is screwed up tight after being dropped through the floor hole. Having a brass collar, the fitting makes a neat setting in the floor covering. The appropriate outlet for either telephone or power is then added to it and wire pulled to it. If the outlet is ever abandoned it can be capped with a brass cap and new outlets located.

Feeding the lighting presented no problem as existing distribution to lighting outlets could be used and the fixtures rehung after being overhauled and cleaned. A substantial increase in the capacity of the building presented a problem that the engineers solved by requiring a new switchboard and a basement ceiling suspended wiring gutter.


BRIDLE RING FOR TEL. CABLE
NEOPRENE COVER GASKET.
11 GA. BRACKET FOR TEL. FEEDER CONDUIT
1 1/4" x 1/8" F.B. SUPPORTS
TERMINAL STRAP FOR TEL. CONDUITS - BOTH SIDES.
FLEX. TO TEL. SERVICE FITTING
FLEX. TO RECEPTACLE SERVICE FITTING
6" X 8" X 3" PULL BOX WITH SCREW COVER. - 1/2" & 3/4" K.O'S ALL SIDES.
FLEX. TO TEL. TERMINAL CABINET
FLEX. TO LIGHTING PANELBOARD.



Weight of 11 roof transformer banks and switchgear is carried on tops of building columns, not roof slab, required no vault



Panels on each floor below transformers supplied through a 7 x 7-in. steel channel

For Los Angeles Furniture Mart

Roof Subs Save Space

Where to put the electrical equipment is no new problem. In the new Los Angeles Furniture Mart Building, Broadway at Washington, every foot of rentable floor space is so precious that the architects, Heitschmidt & Thompson, gave Clare J. Bennett & T. A. McCabe, electrical engineers, and Stetson Electric Co., contractors, no place for substations but the roof and only corridor space enough for distribution panels.

From the 500-kva, 4,160/120-v transformers, eight 1,000-mcm cables, two per phase, cut to exact length and bench-installed with double-barreled T&B lugs, were dropped through 7 x 7-in. square ducts connecting top and bottom of each local floor panel to the second floor. Special permission was granted for a 37% fill because ducts were 6 ft in length and open top and bottom for flue ventilation. Panels were provided with 50% more breakers than now required and feeder sizes calculated for future increases in load. Initial design provides 7½ w per sq ft. Buses in panels are rated for 1,600 amp.

Primary at 4,160 v from a street vault enters the main switch in the basement and three feeders of three 250-mcm conductors are carried to the roof in 3-in. conduit, supported by OZ cable supports, in the basic service core where elevators are also located. The primary is carried along the roof to the primary switchgear cubicles mounted with the transformers on supporting girders resting on the extended tops of building columns to support their weight. The transformers are directly over the riser drop ducts to the panels on each floor below. The building has 12 floors, all but basement and first floor being thus served.

Team who worked out electrical operation program: Henry Morin, maintenance engineer; Mike Boyak, Stetson Electric Co., electrical contractor; Clare Bennett, consulting engineer; Charles Croft, Square D Co.; W. A. Somers, Jeffries Transformer Co.

ELECTRICAL WEST
Construction News

For
- -contractors
- -consulting engineers
- -lighting engineers
- -wiring designers
- -distributor salesmen
- -all interested

Cooling

Some coolness to the idea of professionalizing inspectors developed at the Northern California Chapter, IAEI, meeting at Tiburon when it was explained what it would cost them in application and annual license fees. Inspectors have been hoping that a professional status would raise their own salaries.

Seattle's hiring hall issue taken to the Council on Industrial Relations was turned back to the local union and the NECA for further negotiations to bring the agreement into conformity with the requirements of the labor laws and recent decisions of NLRB.

Wage talks

A brief rundown on wage negotiations: San Francisco Bay area unions were inclined to renege on the 16¢-16¢-17¢ three-year increase but held to it with the provision that the third-year 17¢ be negotiated as to what would be in wages and what in fringe benefits . . . Tacoma local evidently agreed to a 15¢ increase on a one-year contract . . . Oakland local was demanding 25¢, being thelone holdout in the Bay area.

Seattle, Bremerton and Everett locals were asking 50¢ increase with more health and welfare and other fringes. Managements everywhere have been trying to get overtime reduced to time and a half and provisions for shift work in order to develop some remodeling business.

Eye catcher

Billboard on El Camino Real in South San Francisco is one of the ways in which the Electrical Industry Fund of the contractors and union in San Mateo County is calling attention of the public to the need for adequate Housepower. The industry fund committee consists of E. M. Canete, R. C. Electric Co., Redwood City; Jim Hawks, Sharp Park Electric Co., Pacifica; and William J. Varley, San Mateo County NECA, for the contractors; W. H. Diederichsen, business manager; Frank Bouret, president; and Jack Van Winkle of IBEW Local 617. Carl Hilpisch, Belmont Electric Co., is nonassociation committeeman and James R. Tormey, county superintendent of schools, the public member. Joseph D. Barber Associates is handling the advertising.

Award to Oregon's outstanding apprentice, William R. Shird, was recently made by Oregon-Columbia Chapter, NECA, and Oregon Council of Electrical Workers in Portland. Ralph Millsap, left, vice-president, Portland General Electric Co., made the award. O. G. Harbak, vice-president, District 9, IBEW, W. R. Shird and Stan Adams, NECA chapter president, in the picture.

Tailored heat

"Tailor Made Electric Heat" is the slogan of promotion on electric heating installations by the Inland Empire Electric League in the Spokane area. Electric heat installations were up 83% in January 1959 over the same month last year, with a total of 139 jobs installed compared to 76 last year.

Sacramento County has announced that it will permit a demand factor of 75% of electric heating circuits where four or more fixed appliances in addition to an electric range are connected to the same feeder; 80% where more than five automatically controlled electric space heaters are connected; 70% where more than seven and 60% where more than ten. This came as a result of tests in the field with recording instruments in apartment houses heated electrically and backed up by figures on similar tests in the Tennessee State Inspection Authority.

Lighting school

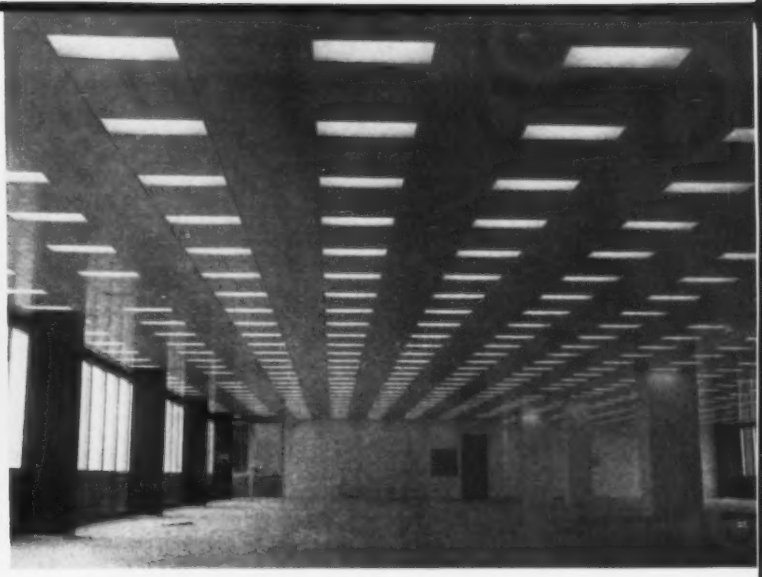
Electrical Contractors Division of the San Diego Bureau of Home Appliances has begun its eighth lighting school for electrical contractors, fixture people, architects and others. It is a six-session course conducted by Bob Huff of San Diego Gas & Electric Co. on Wednesday evenings since March 25 . . . The division is also making plans for a particularly attractive feature of the West Building in the San Diego fair grounds during the Spring Fair. Attention of architects, builders and developers is especially to be attracted to wiring facilities and built-in equipment.

First annual Pacific Coast Builders Conference is scheduled to be held in San Francisco July 6-9 at the Sheraton-Palace. It will be held by the Home Builders Council of California and have exhibits demonstrating new construction methods.

In announcing the death of Pat Powers, last charter member of IBEW Local 125 in Portland, the word "charter" was inadvertently omitted and Floyd Parker, recording secretary, declared the local union is still most active and progressive.

The concentrated NECA estimating course was given in Seattle by Colonel Bobe March 16 under auspices of the Puget Sound Chapter, NECA. 26 were enrolled.

Arizona's Electrical Joint Industry Board president, Dave Walkington (left), vice-president of New State Electric Co., traded the proclamation for Electrical Week for a replica of Edison's first lamp with Phoenix Mayor John Williams (right) at the start of that state's observance of the week. Nearly 600 men and women attended the dinner meeting at the Westward Ho to hear Tony Whan give an inspiring address.



First Western Bank building, Oakland, squeezed in an extra floor, requiring special 1x2-ft shallow fixtures for general lighting

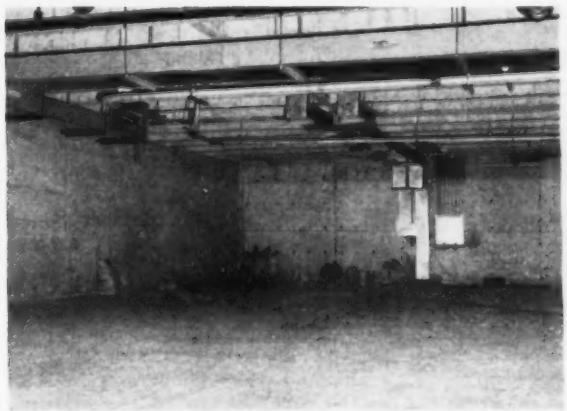
Bank building designed for

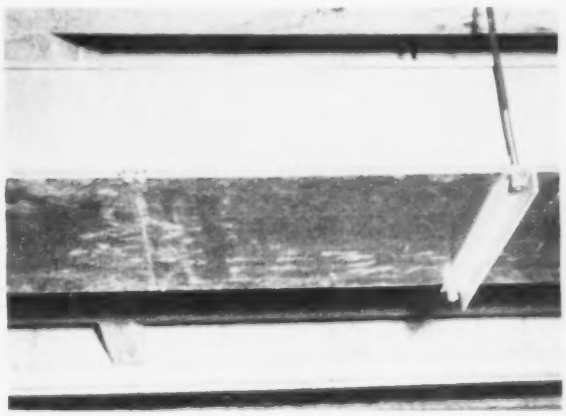
Maximum Rental Space

When individual office switching is wanted a Remcon relay is tapped in the circuit

It was achieved by First Western Bank at its recently completed 18-story Oakland building at 14th and Broadway. To do so Stone, Mulloy, Maraccini & Paterson, architects, gained a full story by compressing floors to an 8½-ft ceiling (13¼ ft between slabs). At least they gave Dudley Dean & Associates, consulting engineers, and electrical contractors Scott-Buttner and A. Neri of California, a joint venture, a cellular steel floor deck for telephone and office machine power. And an adjacent garage building in which to place the bus duct service and main power panel boards. But special shallow two 20-w, 277-v lamp, 1x2-ft fixtures had to be designed to squeeze into the furred space crowded with a hot water radiant heating grid and ventilating ducts and glass wool insulation. Generally, lighting is switched at a main panel for each floor. For exceptions, low-voltage control is used.

Bus duct riser closet, left, on each floor, with fused tap, dry transformer and panels. Below: bus duct across garage ceiling with shield from automobile antennas





Officers and board of governors, CMUA, for 1959: (rear) T. M. Goodrich, Pasadena Light & Power Department; C. E. Plummer, Modesto Irrigation District; L. W. Grayson, Glendale Public Service Department; Tom Killelea, Lodi Electric Department; I. L. Batesman, Los Angeles Department of Water & Power; (front) Ralph Foy, Burbank Public Service Department; R. J. Busatori, Marin Municipal Water District; Paul Beermann, San Diego Water Department; G. A. Baxter, Alameda Bureau of Electricity; C. L. Richey, Sacramento Municipal Utility District; missing from picture, C. E. Edmunds, Truckee Public Utility District, F. V. Frey, Pasadena Light & Power Department, Harold Raines, East Bay Municipal Utility District

CMUA — Its 25th Year

The California Municipal Utilities Assn. annual meeting at the Claremont Hotel in Berkeley presented as the opening speaker Carl L. Richey, Sacramento MUD, who reviewed the 25-year history of the organization. Concluding his very comprehensive review of the association's activities, he stated that the group could look forward with confidence to even greater achievements when the time comes to celebrate the Golden Anniversary.

Commenting on the proposed California-Columbia River Basin transmission tie, Alex Radin, general manager of American Public Power Assn., commented that a twin circuit 345-kv power line would have a five-to-one benefit to cost ratio. Radin asserted that both areas would benefit by the tie, and urged CMUA to take part in hearings.

A. H. Driscoll, Los Angeles assistant city attorney, charged the group to measure its performance to see if it is meeting the challenge of municipal ownership. He stated, "If we cannot demonstrate that we are doing a better job and at lower rates, then there is something wrong with us. Our customers might be better served by a private utility." He made certain that the drive for lower rates did not indicate a hand-to-mouth financial program or shortsighted planning for future requirements. He pointed to some very realistic yardsticks for measuring performance. He cautioned the group against misleading comparisons, but urged that each member seriously evaluate his performance.

F. H. Eastman of East Bay MUD presented a splendid discussion of the mechanics of preparing for a major bond election. Eastman, whose organization received a 3½-to-1 passage of a recent bond election, stated that if each member was not planning for his next election, he was "already behind schedule." His comments were particularly valuable with respect to the means of gaining favorable public reaction.

Bank of America's Alan K. Browne discussed the special problems associated with the marketing of municipal bonds. He stressed the importance of the tax immunity, and pointed out the extreme importance of maintaining this advantage if municipal securities are to find a market. He pointed to other important factors such as municipal credit, the supply and demand of money, the general state of the money market, as well as the effect of the demand of the state for large sums of money.

James K. Carr of Sacramento MUD reported on his organization's development of the Upper American River. In addition to discussing the physical development, he discussed the effect of the new power source on SMUD's over-all cost of power, and indicated that the Upper American River development would ultimately save SMUD customers $4,000,000 annually.

Clarence A. Winder, utility consultant, discussed the various methods of depreciation accounting and reviewed the hearings before the California commission regarding depreciation methods. He indicated a personal feeling that the PUC should control the private utilities' debt ratios, and through this control hold down rates.

The association (not always unanimously) resolved that (1) power facilities on the Trinity project should be constructed by the federal government, (2) that the State of California should study the proposed Pacific Northwest-California intertie, (3) that assembly constitutional amendment No. 17 calling for PUC control of municipal bodies be opposed, and (4) that state assembly bill No. 658 authorizing a privilege tax on tax-exempt utility properties be opposed.

The group installed as new officers Robert Brusatori, Marin Municipal Water District, as president; Ralph Foy, city of Burbank, vice-president; F. V. Frey, city of Pasadena, secretary; and Glenn Baxter, city of Alameda, treasurer.

A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

Depreciation Reform—

Why Industry Needs A Modern Tax Policy

A shockingly large proportion of our industrial plant and equipment is obsolete. As indicated by an earlier editorial in this series, over $95 billion would have to be spent —and spent soon—to bring our industrial facilities up to the best modern standards. Yet plans for 1959 call for little more than $30 billion of actual spending—barely enough to make a start on this backlog of modernization.

At the heart of the problem of obsolescence is a federal tax policy that discourages business from replacing inefficient facilities. It is the purpose of this editorial to spell out a tax reform Congress can make this year—with little cost in terms of tax revenue—that would go a long way toward removing the barrier to modernization of plant and equipment. This reform is a more realistic system of tax deductions for depreciation and obsolescence of productive facilities.

A Barrier to Modernization

Industry abounds with examples of old and obsolete facilities—despite large expenditures made in the past few years. Two-thirds of our metalworking equipment is over ten years old. Over half the capacity of our chemical process industries was installed before December 1950. Only a minor fraction of our railroad freight moves in new freight cars or the new push-button freight yards.

The tax law bears a large part of the responsibility for this lag in modernization because of its important influence on business investment in plant and equipment. For many years the tax law has permitted as a deduction from income "a reasonable allowance" for wear and tear and obsolescence of productive facilities. These annual deductions affect business investment in several ways.

- They are the way a company recovers its investment in plant and equipment.
- They determine in large measure, the amounts of money that are spent each year to replace and modernize facilities.
- Furthermore, the schedule for depreciation often determines **when** a specific machine or building is actually replaced.

The law requires that depreciation deductions be spread over the "useful life" of a building or machine. But the periods of useful life for tax purposes today still depend heavily upon tables drawn up by the Treasury almost 20 years ago. These tables reflect the replacement practices of depression years. Also, they were compiled at a time when the pace of technological progress in industry was much slower than it is now. **For nearly all types of equipment the indicated period of useful life is longer —sometimes much longer—than most experts consider realistic at today's rate of technological advance.**

The result of these outmoded depreciation schedules is that the recovery of investment is dragged out, and the replacement of obsolete equipment is delayed.

In The Right Direction

Congress should establish, by law, the right to use shorter depreciation periods on productive equipment. It should do so in a way that would free industry from obsolete concepts of the rate of technological change and would provide incentives to install new equipment and produce new products.

The tax reform act of 1954 made some progress in this direction—but not enough. It introduced new methods for calculating depreciation —the declining balance and the sum-of-the-years' digits—which enable a business to recover most of the investment in a new facility in the early years of its useful life. However, these new methods do not accomplish their desired purpose when the supposed "useful life" is still an unrealistically long period of years.

Industry is by no means free from blame for the failure to bring depreciation policy into line with the needs of a modern, growing economy. According to Joel Barlow, president of the Tax Institute, "management has largely ignored the Commissioner's invitation . . . to come into the Internal Revenue Service office and make a case for shorter depreciable lives by establishing technological obsolescence."

The failure of many companies to see their own interest in more realistic depreciation not only holds them back from modernizing their own facilities but also lends support to the Treasury in its continued adherence to an outdated policy.

A Suggestion For Reform

An excellent model for reform of the depreciation policy in our tax law is the system used successfully in Canada for a decade. In Canada, all productive equipment may be depreciated at relatively fast rates assigned to each of 14 broad categories. The Canadian system permits depreciation up to twice as fast as the antiquated tables of useful lives now followed in the U. S. It also gives the individual business far greater flexibility in determining depreciation schedules that fit its own needs and experience.

For example, in the category or "bracket" covering general machinery a taxpayer in Canada may depreciate up to 20% of the machine's value annually, on a declining balance basis. In the U. S. the fastest rate at which many types of machinery can be depreciated is only 10%. In other categories, from tools and dies to buildings and pipelines, the Canadian system also allows faster depreciation and provides greater incentive to invest in new facilities.

The cost of this reform in terms of lower tax revenue would be small—probably less than $500 million in the first year. And even this would merely be postponed, not permanently lost. Indeed, there is a very good prospect that tax revenue would not suffer at all. The increase in spending for new plant and equipment resulting from this tax reform would mean an increase in wages and profits—and therefore in taxes—in industries that produce machinery and other capital goods.

A realistic tax policy on depreciation would provide a badly needed incentive for industry to replace obsolete and inefficient facilities with up-to-date plants and equipment. It would step up our rate of technical advance and economic progress. And it would put U. S. industry in better shape to meet the growing competition from other countries that have grasped the advantages of fully modern technology.

This message was prepared by the McGraw-Hill Department of Economics as part of our company-wide effort to report on opportunities for modernization in industry. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or part of the text.

Donald C. McGraw
PRESIDENT
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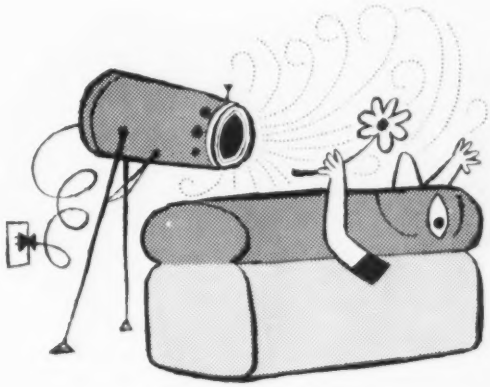
Can these new electronic marvels save you money?

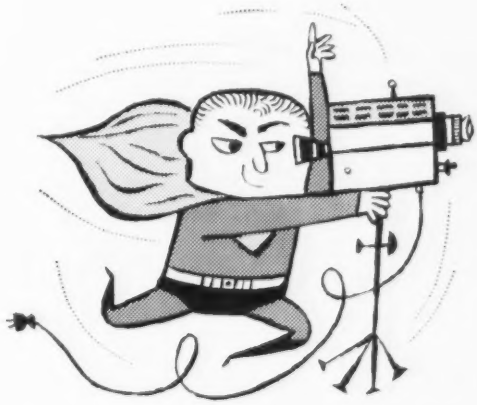
The new techniques in electronics are limitless . . . are helping many businessmen make better products at lower cost. Here are four of the newest which may help you:

Electronic "detective" hunts transient metals. Powerful, new metal detectors now "frisk" plastics, wood, rubber, textiles for transient metals—and *find* them—even when deeply embedded.



Electronic "gun" keeps bread fresh for months. Smaller, lighter generators of electron beams now destroy bacteria, moulds, yeast — sterilizing foods and drugs without changing flavor or appearance.

"Silent sound" scrubs tiny component parts. Improved ultrasonic generators now clean tiny component parts in *seconds*, where cleaning by hand has been costly, even impossible.



TV gives "superman sight" to industry. New, small TV cameras let operators peer through walls, around corners, under ground—even watch highly dangerous operations in complete safety.

New techniques in electronics exist in almost every field. We'll help you get information on techniques that apply in your field.

Pacific Gas and Electric Company

For phone number of closest representative see advertising index in back of book.

Before you buy another

transformer... ANALYZE PRICE

General Electric keeps price down with standardization, volume, product innovation

Using the period from 1935 to 1939 as the base, nonferrous metals are up 135%, iron and steel up 174%, and labor is up 234%. Yet G-E pole-type distribution transformers are now up only 66%.

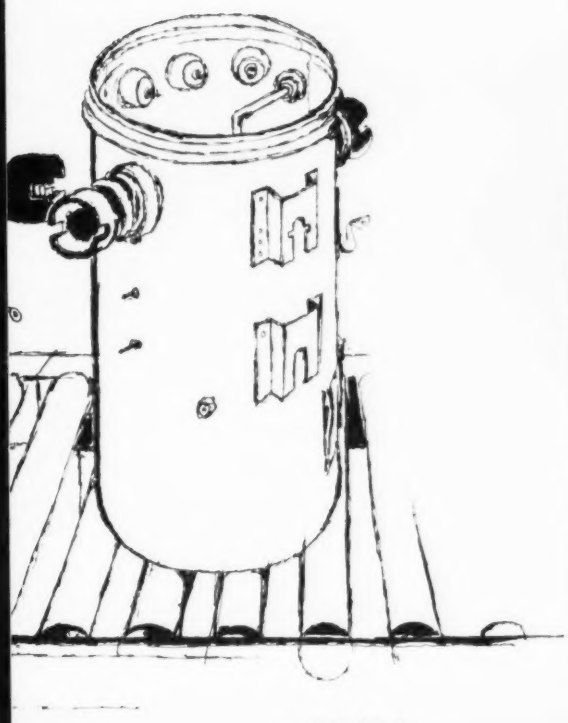
The cost of transformers remains comparatively low thanks in part to your increasing number of large-volume orders and to your support of standardization programs. Both contribute importantly to economical mass production.

Product innovations have also helped keep transformer prices down. General Electric's $1,000,000 development of grain-oriented strip steel, for example, has resulted in an estimated saving of over $300,000,000 to utilities since the steel was introduced twenty years ago.

Before you buy another distribution transformer, analyze price—give your transformer manufacturer credit for the extra values he gives you. General Electric Company, Schenectady 5, New York. 431-82

Progress Is Our Most Important Product

GENERAL ELECTRIC



GIVE YOUR TRANSFORMER MANUFACTURER CREDIT FOR THE EXTRA VALUES HE GIVES YOU

		G.E.	OTHER MFRS.			
MEASURE LOAD BUILDING—do Co.'s other products build load? Does Co. sponsor load-building programs?						
CHECK SERVICE—24-hour shipment? repair and uprating? emergency assistance?						
COMPARE FEATURES—how many exclusive features in terms of longer life; reliability; easy maintenance?						
ANALYZE PRICE—does Co. hold line against inflation with significant product developments?						
EVALUATE INNOVATIONS—has Co.'s research paid off for you? Recent examples?						

FILL IN THE BLANKS . . . See which manufacturer gives you more for your transformer dollar: Mark "X" for a measurable contribution, "O" for insignificant contribution.

A kitchen like this promises...

LUXURY ELECTRIC LIVING

MEDALLION HOME
LIVE BETTER ELECTRICALLY

and this award guarantees it ...without added cost

When you're buying a new home, remember: The Medallion Home emblem identifies the extra-value homes which meet *all these standards* of the nation-wide Medallion program for better housing:

Major electrical appliances — including a new automatic electric range and oven — already installed and *included in the purchase price.*

Proper lighting provided for in work, play and traffic areas... illumination for beauty as well as for your family's safety and comfort.

Full Housepower wiring — ample for all your present appliances *and* the many you will want in future years.

Resale value is protected, because a Medallion Home will *stay* modern in the all-electric future.

The Medallion adds to the value of your new home. No family should buy a home without it.

SOUTHERN CALIFORNIA Edison COMPANY *helps you* LIVE BETTER—ELECTRICALLY

See your appliance dealer today...it's all-electric value time

Note how ordinary EMT split early in pressure test while induction welded CIRTUBE EMT (shown here unplated) held fast, surpassing UL requirements.

BETTER WELDING

on new CIRTUBE EMT means easier, split-free bending

THERE are many reasons why new CIRTUBE EMT will help you get faster, cleaner wiring jobs. Most of them are listed here.

One *big reason*, however, is *continuous induction welding*—by far the best technique available for making bead-free, split-free welds on high quality EMT.

It is virtually impossible to split an induction-welded EMT no matter how severe the bends. And the perfectly clean weld means uniform roundness—easier, neater bending without the slightest kink or flattening. Your men get it right the first time around.

Try induction-welded new CIRTUBE EMT soon as you can. Your wholesaler has it now—bundled with distinctive orange colored tape to identify the EMT manufactured to Circle's quality standards.

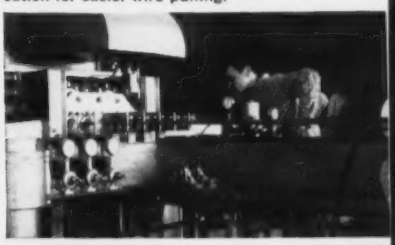
CIRCLE WIRE & CABLE
a subsidiary of CERRO DE PASCO CORPORATION

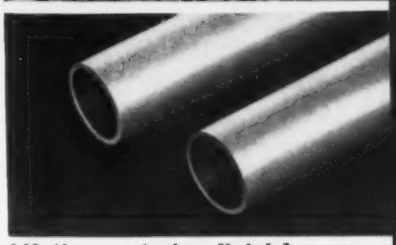
PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** in all principal cities
RUBBER COVERED WIRES & CABLES • VARNISHED CAMBRIC CABLES • PLASTIC INSULATED CABLES
NEOPRENE SHEATHED CABLES • "CIRTUBE" EMT

CIRTUBE EMT *Ask for it!*

Proper steel plus! The best cold rolled steel plus the right handling give CIRTUBE EMT its natural bendability.

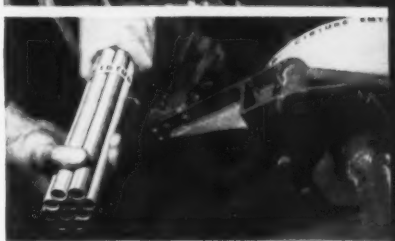
Easy fishing! A baked-on protective coating gives CIRTUBE EMT a built in lubrication for easier wire pulling.





Lifetime exterior finish! Hard galvanized finish for durability; polished satin lustre for lasting good looks.

Automated quality control! Automatic controls assure complete and continuing uniform quality of product.



Tight, easily handled bundles! Bright, orange tapes hold CIRTUBE EMT securely for easy handling on and off the job.

Fast, friendly service! Well-known Circle service through a nation-wide network of well stocked nearby warehouses.

Look at the record

BROWN BOVERI

Year after year BROWN BOVERI has opened new vistas in extra-high voltage equipment and applications. Today BROWN BOVERI can point to 2,450,000 KVA in EHV transformer capacity delivered or on order. More than 133 air-blast circuit breakers rated 300 KV and above have been in successful operation for years both in North America and Europe.

A record of world-wide confidence in BROWN BOVERI EHV transformers and air-blast circuit breakers has been established through actual use and top performance. Maximum design voltage of most of this transmission equipment is 460 KV. Pioneering research and development of transformers and air-blast breakers rated up to 650 KV is in progress at BROWN BOVERI.

In your system planning, it may pay you to consider BROWN BOVERI'S unmatched background in the field of extra high voltage.

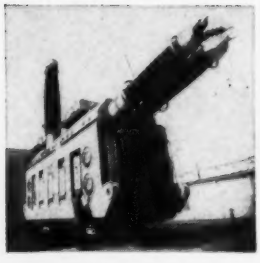
The complete record is yours for the asking.

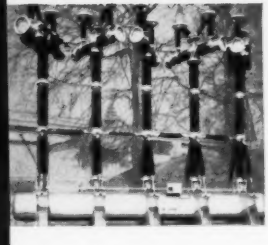
EHV TRANSFORMERS

Client and Shipping Date	KVA and Voltage Rating
Krangede AB Sweden 1956	two banks 130 MVA each, 13.8/400 kV step-up generator transformers
Kraftwerke Hinterrhein Switzerland 1957	two banks 400/280/187 MVA 420/201/10 kV *regulating* auto-transformers
RWE Germany 1958	one bank 660 MVA, 400/230/30 kV *regulating* auto-transformers
EDF France 1958	one bank 300 MVA, 380/230/10 kV
Imatran Voima Oy Helsinki, Finland 1960	four single-phase three-winding auto-transformers, three-phase bank rating 420/420/55 MVA, 380/238/20 kV

EHV AIRBLAST CIRCUIT BREAKERS

Client and Date of Order	Quantity	MVA & Voltage Rating	
KVS Sweden 1951	10	10000	400 kV
Kamijoki Finland 1955	2	10000	380 kV
Quebec Hydro 1954	23	10000	300 kV
Imatran Voima Oy Finland 1956	2	10000	380 kV
Quebec Hydro 1956	39	10000	300 kV
Imatran Voima Oy Finland 1957	5	10000	300 kV
Imatran Voima Oy Finland 1957	1	15000	400 kV
American Electric Corp. 1957	2	25000	345 kV
RWE Germany 1957	2	15000	400 kV
Aluminium Co. Canada 1957	4	15000	300 kV
Krangede AB Sweden 1957	2	15000	400 kV
Aluminium Co. Canada 1957	5	10000	345 kV
Aluminium Co. Canada 1957	4	10000	345 kV
Aluminium Co. Canada 1957	5	10000	345 kV
Motor Columbus Switzerland 1957	2	15000	400 kV
Imatran Voima Oy Finland 1957	3	15000	400 kV
KW Vorderrhein Switzerland 1958	6	15000	400 kV
Kemiyoky Oy Finland 1958	1	15000	400 kV
Electricity Supply Commission South Africa 1959	16	15000	275 kV





BROWN BOVERI CORPORATION

19 Rector Street, New York 6, N. Y.

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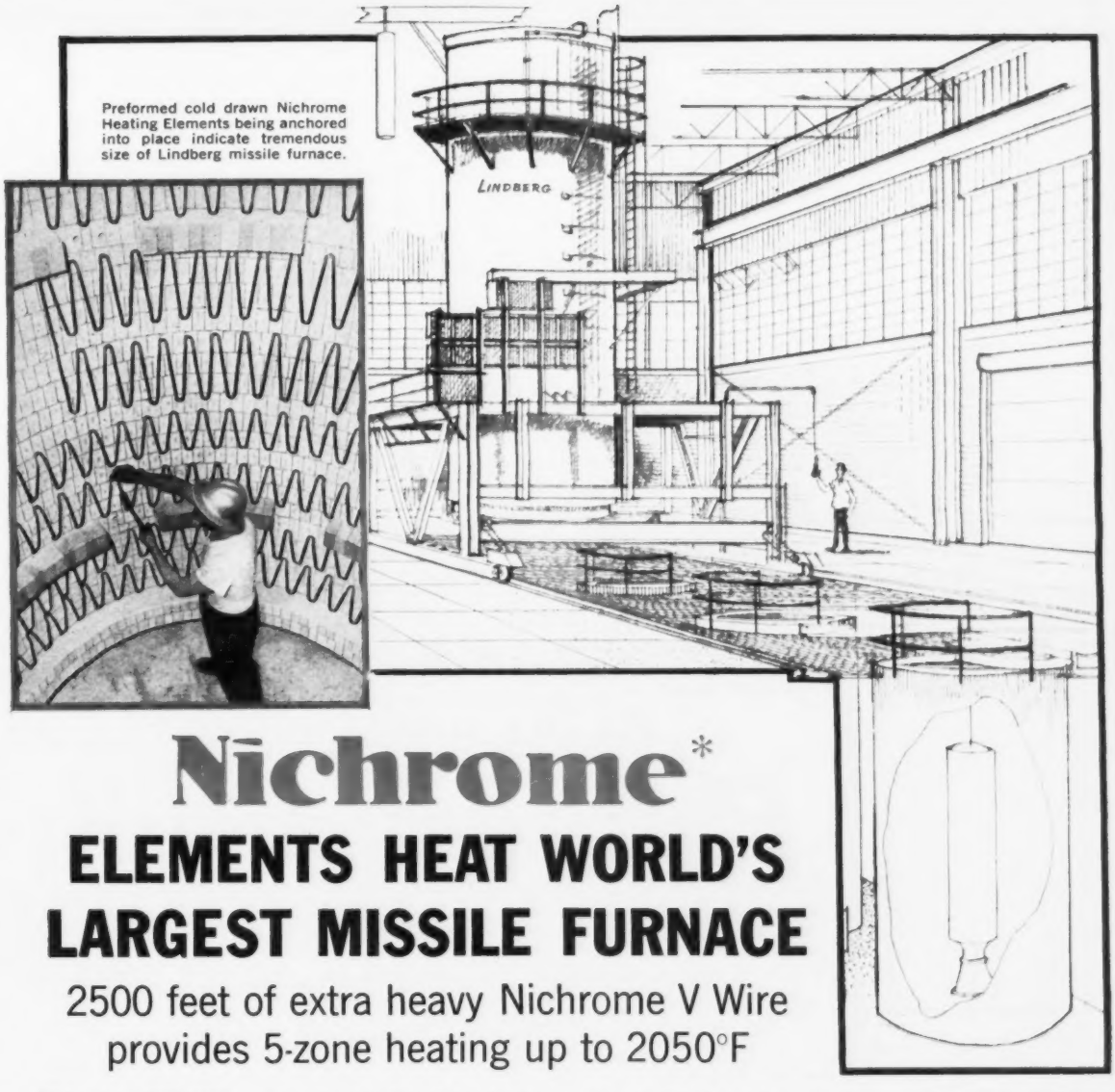


Preformed cold drawn Nichrome Heating Elements being anchored into place indicate tremendous size of Lindberg missile furnace.

Nichrome*

ELEMENTS HEAT WORLD'S LARGEST MISSILE FURNACE

2500 feet of extra heavy Nichrome V Wire provides 5-zone heating up to 2050°F

This giant 500 KW gantry type Lindberg† hardening furnace is the newest and largest ever built to meet the most exacting heat treating requirements of today's, and tomorrow's, missile metals. It accommodates an effective work load nearly 7 ft. in diameter and 24 ft. long.

Now in operation at Lindberg Steel Treating Company's Melrose Park Plant, the controlled atmosphere installation is both bottom loading and bottom quenching. The 19′ by 57′ pit—28′ deep, beneath the towering electrically heated furnace, houses the loading station, 2 quench tanks (atmosphere and salt) and water wash tank. Work loads pass from furnace to quench through an airtight seal, permitting complete control and precise duplication of atmospheres and treating cycles.

In the hardening furnace there are five control zones which operate between 250°F and 2050°F. Saturable core reactors automatically vary the voltage to the Nichrome*V heating elements between 2.2 and 220 volts, depending on temperature and load.

The selection of Nichrome V by Lindberg to supply reliable and closely controlled heat and temperature in this furnace is further evidence of the confidence that industrial leaders have in the quality and performance of Driver-Harris high-nickel alloys. Why not benefit from their experience. Tell us about your requirements. *T.M. Reg. U.S. Pat. Off. †Lindberg Engineering Company

DRIVER-HARRIS* COMPANY

HARRISON, NEW JERSEY • BRANCHES: Chicago, Detroit, Cleveland, Louisville

Distributor: ANGUS-CAMPBELL, INC., Los Angeles, San Francisco • In Canada: The B. GREENING WIRE COMPANY, Ltd., Hamilton, Ontario

MAKERS OF THE MOST COMPLETE LINE OF ALLOYS FOR THE ELECTRICAL, ELECTRONIC, AND HEAT TREATING INDUSTRIES

For phone number of closest representative see advertising index in back of book.

DEVELOPED TO MEET YOUR NEEDS:

A COMPLETE LINE OF

for all your installation

CLASS 200 **CLASS 100** **CLASS 10**

Sangamo Type P Meters offer unusual economies with accurate measurement.

Available now for all polyphase loads. The meters start at 18 watts—operate continuously at 96,000 watts.

You can calibrate in half the time. There are up to four fewer adjustment points. In addition to micrometer power factor adjustment, the P2 Meter has only three adjustments—full load, light load, and balance.

You save money in glass covers. These meters are the only polyphase meters small enough to use your standard metal base singlephase meter covers.

You have greater surge protection. Current windings are encapsulated in high strength epoxy resin insulation. Both current and potential coils have breakdown in excess of a 15 KV surge.

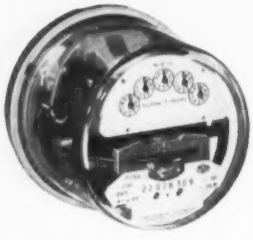
You gain economy through slow speed. Reduced series damping and fewer revolutions just naturally mean greater accuracy and better performance.

SANGAMO ELECTRIC COMPANY

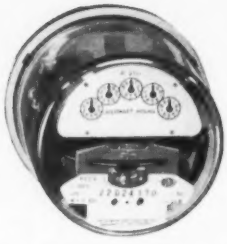
SPRINGFIELD, ILLINOIS

JM59-4

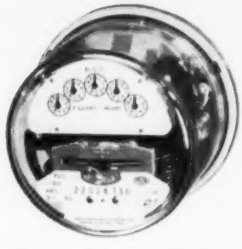
LIFETIME GUARANTEED SANGAMO TYPE P METERS FOR



Class 200 4 wire, 2 stator Delta

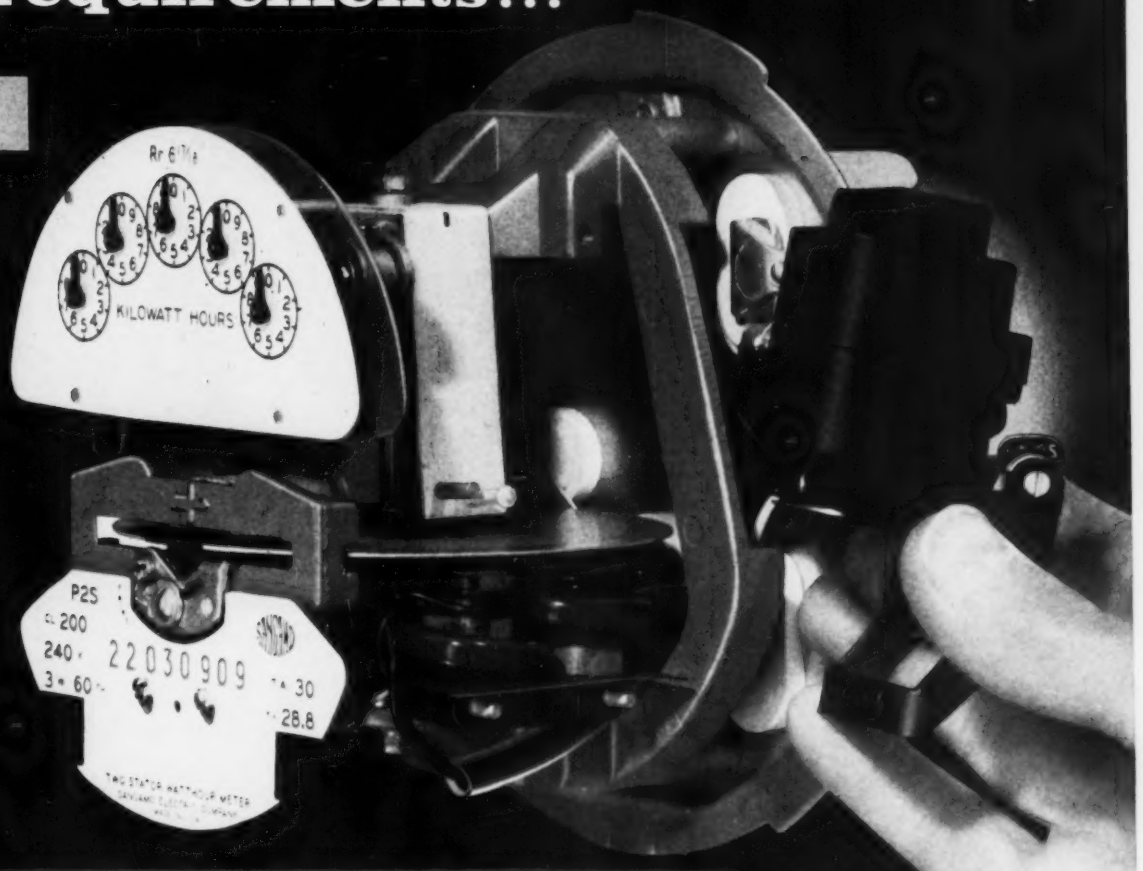


Class 200 4 wire, 2 stator Wye

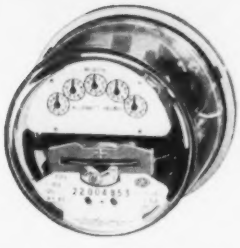


Class 100 2 stator Network meter

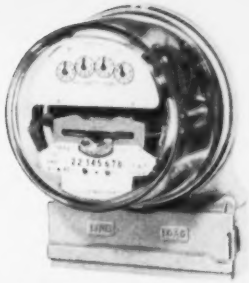
POLYPHASE METERS
requirements...



ALL POLYPHASE MEASUREMENT



Class 100 3 wire, 3 phase, 480 v.



Class 10 4 wire, 2 stator Delta

The potential coil can be removed and replaced without disassembling other components. *Replacement time is cut in half.*

50TH ANNIVERSARY SANGAMO 1899-1959

For phone number of closest representative see advertising index in back of book.

news

When the United States Air Force displayed some of its largest transport aircraft at the Phoenix Sky Harbor airport recently, Arizona Public Service Co. was called on to supply lighting at right

T. M. Blakeslee, electrical engineer in charge of operations, and Bradley Cozzens, assistant chief electrical engineer of Los Angeles Department of Water & Power, visit the Alcoa display at the AIEE Winter Meeting in New York. Alcoa's P. H. Mougey is host

Sid Llambias, Salem builder and contractor (right), won Portland General Electric Co.'s 1958 Medallion Home contest. Here Fred Starrett, PGE division manager, presents medallion to Llambias, who also received a trip to Mexico City for himself and wife

Now under construction on the main campus of Los Angeles Trade-Technical Junior College is the second model home built by the students of school's building trades and electrical departments. The project was undertaken last year for the first time and it is hoped that it will be repeated each year. The home will be opened to the public sometime in May. Again it will be sold to the highest bidder, using a sealed bid form

Distributors and retailers of electric commercial equipment showed new products at the Open House presented by Pacific Gas and Electric Co. in Santa Rosa. Here Emmett L. Blair, Hobart factory representative, makes his pitch. (See Market Development)

EW

Management

North-South Link

Importation of surplus Columbia River power into California moved one step closer as officials of the Bonneville Power Administration, Pacific Gas and Electric Co. and the California Oregon Power Co. reached a tentative agreement on the way to link BPA with PG and E. In essense, Copco will transmit Bonneville power delivered to it at northern points on its system which spreads across southern Oregon and export that power to a PG and E connection near Klamath Falls. The California company would build approximately 90 miles of 230-kv transmission lines to connect the latter point with its main transmission system at Pit substation No. 3 east of Redding.

BPA will have surplus summer power for the next 10 years. It hopes to get senate approval for its sale to PG and E.

Employees Offered Savings Plan

The Pacific Gas and Electric Co. has announced a new savings fund plan for employees wherein the company will match dollars saved by individual employees on a one-for-two basis. Depending upon the length of service individual employees may contribute from 2 to 6% of straight-time pay and such contributions will be invested by a trustee in either PG and E stock, government bonds or half in each. Each dollar thus contributed by the employee to the savings fund is matched by a 50c contribution from the company, all company contributions being invested in PG and E common stock. The Bank of California, National Assn., is the trustee of the funds.

Employees may draw stock, bonds and cash accruing from their own contributions at any time. They may withdraw stock and cash accruing from the company contributions only on the date which they "vest" (at the end of the third year following the year such company contributions are made).

On termination of service by retirement, death or total and permanent disability, all of the stock, bonds and cash accrued from individual and company contributions are distributed either to the person himself or his beneficiaries. Termination of service for any other reason still permits the employee to receive everything except the stock and cash accrued from company contributions which have not yet been vested in the individual account.

Regular employees of more than five years' service are eligible to participate on an entirely voluntary basis in the savings fund program. In announcing the plan, PG and E President Norman R. Sutherland stated his belief that it would appeal to most of the employees because it provides an opportunity to build up savings and share in the company's future. So far as is known, this is the first such plan to be inaugurated by a major public utility system.

Gift to Education

The Washington Water Power Co. has given its former downtown Spokane office building to the Spokane school district. The structure will be used for office space for school administrative departments. School Superintendent William C. Sorenson estimated that the district would have to pay $700,000 to acquire a similar facility of its own. Also included is the utility's former downtown parking lot.

Late last summer, Washington Water Power moved from various locations in Spokane into its new $7,500,000 central service facility on the Spokane River on the city's north side.

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Atom Waste Disposal Costly

Brought out at a recent hearing of the Joint Congressional Committee on Atomic Energy were facts concerning the mountainous costs of radioactive waste disposal, which must be considered in any realistic discussion of target dates for "economic" nuclear power. The hearings brought out the fact that potential hazards from radioactive wastes of peacetime atomic power uses are liable to be greater than the fallout from atomic bomb tests. High-level radioactive wastes involve supervision and control in some instances for hundreds of years. Actually no solution to the problem of high-level waste disposal is in sight.

Meanwhile AEC has licensed the Coastwise Marine Disposal Co. of Los Angeles, Calif., as an authorized disposal agency for radioactive waste material. Under the AEC license the company would be authorized to collect low-level waste material in containers, package it to insure safe handling during transportation and sinking it in the Pacific at a disposal site approximately 130 miles southwest of Point Arguella, Calif. Containers must be such that the waste would sink to 6,000 ft, which is about one-half the depth of the ocean at that point.

Merger in Prospect

The Pacific Power & Light Co. is proceeding with negotiations for an acquisition of the Rawlins (Wyo.) Electric Co. which serves about 3,800 customers in the Rawlins-Sinclair area of Wyoming. The stockholders and directors of both companies would have to approve such an action as would the Public Service Commission and Federal Power Commission. If approved, the merger of the two companies could be accomplished through an exchange of stock.

► Puget Sound Power & Light plans to sell $10 million worth of preferred stock this spring, proceeds from which will be used in financing the company's 1959 construction program of $23.7 million.

Portland Companies Seek Rate Hike

The Portland General Electric Co. and Pacific Power & Light Co. are awaiting the date for a public hearing by the Oregon Public Utilities Commissioner on the rate increases they filed last Dec. 22. PP&L estimated it would earn less than 5% on a fair value under rates now in effect. And even if the proposed rates were in effect for the full year 1959, its rate of return would still be under 6%.

In one of his last official acts, former OPU Commissioner Howard Morgan suspended the proposed rates for six months beyond the nominal effective of Jan. 26. The proposed new rates would produce approximately $9 million of additional revenue for the two companies.

► Bids for the largest single construction award ever to be placed in the Pacific Northwest will go out this month. The Grant County PUD will ask for costs for the construction of the Wanapum Dam and power house to be located upstream on the Columbia River from the Priest Rapids Dam now being built by Merritt-Chapman & Scott of New York. Costs of the installation are expected to be at least $100 million and the facility will provide 832,000 kw.

► Seattle has been approved as the site for the annual convention of the American Public Power Assn., which will meet in that city May 26-28. Theme for the convention is "Low-Cost Power for Prosperity."

► Acquisition of the entire electric system of the Verde Electric Cooperative Inc. of Cottonwood, Ariz., by the Arizona Public Service Co. will take place if an application filed with the FPC by the latter organization is approved. The co-op serves some 400 customers and APSCO will take over by paying total liabilities and obligations of the co-op, which are calculated at a net of $573,600 as of Oct. 31, 1958.

► **James E. McCaffrey** has resigned his position as general manager and chief engineer of the Sacramento Municipal Utility District effective June 1 of this year because of the general state of his health. The board of directors announced that **Paul E. Shaad** has been selected as McCaffrey's successor. For the past 4½ years he has received special training as assistant general manager and assistant chief engineer and is thoroughly familiar with all aspects of the district's operations.

► Portland General Electric Co. celebrated Oregon's 100th birthday as a state with a Centennial issue of its house organ, the *Bullseye*. Pictures of PGE's years of service dated back to 1889. Reproduction of an 1899 electric bill to an opera house showed 64,500 watt-hours used for $10.632—16c a kwh.

Growth

Provide for Fish Passage At High Mountain Sheep

Pacific Northwest Power Co. has disclosed the details of its upstream and downstream fish passage facilities for use in conjunction with its proposed High Mountain Sheep Dam. The recent release indicates a by-pass canal and river screen that would carry ocean-bound fingerlings around the dam, discharging them into the Snake River below the dam.

Opponents of the High Mountain Sheep Dam favor construction of the Nez Perce Dam which, being below the confluence of the Snake and the Salmon, is clearly in trouble with the fish interests. The Nez Perce bloc has before the Oregon Hydroelectric Commission a proposal to withdraw the waters of the middle Snake from further development, presumably until such time as the Nez Perce fish problem is solved. With fish no longer a problem at High Mountain Sheep, the decision should be reduced to its elemental form—one of politics.

160-ton transformer arrives for installation at Portland GE's Bethel sub. Special routing for the giant unit required one month for shipment from Sharon, Pa.

West's Largest Transformer Delivered to Portland GE

A 160-ton, 125,000-kva transformer, reported to be the largest transformer ever installed on the Pacific Coast, has been delivered to Portland General Electric Co. for installation in the $1,000,000 Bethel substation.

The substation is scheduled for completion in September.

Pay Agreement Reached On Priest Rapids-Wanapum

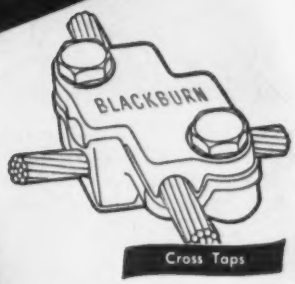
Grant County PUD has agreed to pay $454,000 to the Washington State Game Department over a five-year period to cover the loss of 64,000 whitefish and 120,000 steelhead annually. This settlement has been worked out jointly between biologists for the state and the PUD, together with sportsmen, and will presumably cover the losses resulting from the construction of Priest Rapids and Wanapum Dams. Meanwhile, the state legislature is rushing legislation for construction of a $500,000 fish hatchery, which will plant fish in Grant County waters to offset the losses caused by the dams.

► Southern California Edison has applied to the California PUC for a certificate to build a third generating unit at its Huntington Beach steam plant. The new unit is estimated at $30 million.

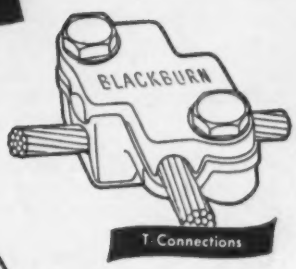
► What is said to be the power utility industry's first "dual beam" microwave system will be installed by Grant County PUD near Ephrata. General Electric engineered it.

You can handle a wide variety of jobs with this

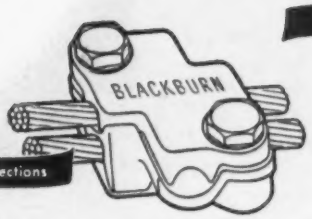
Stronger, More Versatile BLACKBURN Cross Tap CLAMP



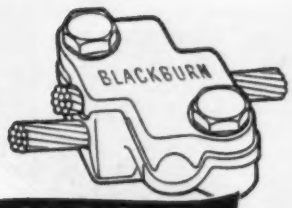
Cross Taps



T-Connections



Parallel Connections



End-to-End Connections

Get quick service for a large number of different connection and wiring jobs with BLACKBURN'S Cross Tap Clamp.

- **Eight connectors accommodate cable sizes from #6 to 1000 MCM.**
- **Made of high strength copper alloy; silicon bronze bolts; phosphor bronze shakeproof lockwashers.**
- **Rounded edges for easy taping.**
- **Greater wrench rotation with either end or socket type speeds installation.**
- **Available from Electrical Distributors everywhere.**

Also available completely tin plated for general purpose work.

JASPER BLACKBURN CORPORATION

1525 WOODSON RD., ST. LOUIS 14, MO., WYDOWN 3-9430

For phone number of closest representative see advertising index in back of book.

It's a deal. Supt. L. A. Garrison of Yellowstone National Park studies the contract he signed with Montana Power Co. for commercial power. Looking on, J. E. Corette, president, Montana Power (second from right), Sam A. Hoover, National Park Service (left), and R. C. "Dick" Setterstrom, Montana Power industrial development engineer (right)

Montana Power Supplies Yellowstone Park Service

Montana Power Co. has signed a contract to bring commercial electricity to Yellowstone National Park. L. A. Garrison, Yellowstone Park superintendent, stated: "The government will save about $1,500,000 because commercial power is coming to the park." This is the amount of money the park would have had to invest to build adequate power facilities. Work will begin when weather permits, and the lines will be completed this year.

People

► **W. L. Thrailkill,** Washington Water Power Co. vice-president in charge of finance, has been honored by the Spokane chapters of two engineering societies in connection with his work in the planning, design and construction of WWP's service center and office building, completed last year. He was named "Inland Empire Engineer of the Year" by the Spokane chapter of the Washington Society of Professional Engineers, and also "Electrical Engineer of the Year" by the Spokane Section of the American Institute of Electrical Engineers.

Thrailkill

Kimmich

Walker

► **L. R. Kimmich** has been appointed Phoenix commercial manager for Arizona Public Service Co. It is a new position. **Ray Walker** will succeed Kimmich in his former post as Yuma division manager. New manager of the metropolitan division electric operations is Jack L. Kamrar, and new manager for gas operations in the division is J. P. Watkins. Jesse F. Thomas has been appointed division engineering manager. All positions are new in the company.

► **James K. Carr,** assistant general manager of Sacramento Municipal Utility District, has been nominated by Governor Edmund G. Brown to the California Water Commission. His appointment to succeed Clair A. Hill of Redding is subject to confirmation by the state senate. The position carries no salary.

Bechtel Reorganizes

Bechtel Corp. is making organizational changes in the hydro section of its power and industrial division, which will consolidate the design organization in San Francisco. The move of hydro staff members from Vernon, Calif., to San Francisco will be accomplished over the next six months. Only exception will be hydro engineering for Southern California Edison Co., which will remain in Vernon.

First appointments resulting from the consolidation have been made. J. George Thon, formerly chief civil engineer of the power and industrial division, has been named manager of hydro engineering.

M. L. Dickinson, chief hydraulic engineer, will devote most of his time to major hydro project planning studies and hydro business development.

Leslie A. Irvin has been appointed chief civil engineer of the power and industrial division.

► **L. L. Bergendahl** has been appointed Western district sales manager, located in Los Angeles, for the Johns-Manville Dutch Brand Division. He began his career with Johns-Manville in 1937 as a sales representative for the company's industrial building products department in Chicago.

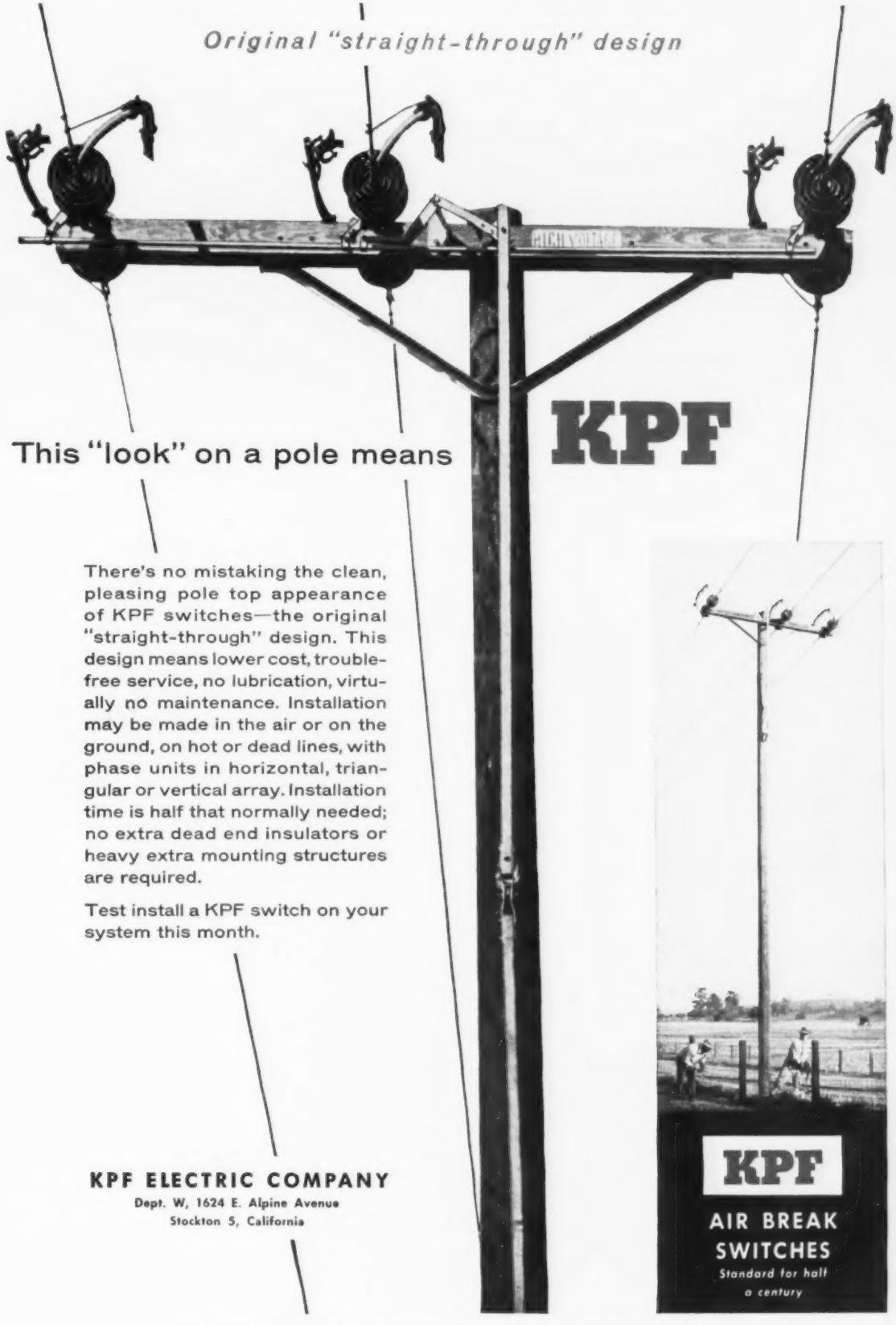
► **James B. Black,** board chairman of Pacific Gas and Electric Co., was recently named "Alumnus of the Year" by the University of California. He was picked as the top alumnus of 1958 "for his distinguished contributions to the development of Western power resources."

Whiteley

Beardsley

► **Frank D. Beardsley** has been appointed general superintendent of system protection for Pacific Gas and Electric Co. He succeeds **Earl Whiteley,** who retired March 1. He joined PG and E in 1954 in the consolidation with Coast Counties Gas & Electric Co., where he had worked since 1926. Whiteley was with Great Western Power Co. since 1923 until the consolidation in 1930 with PG and E.

Original "straight-through" design



This "look" on a pole means **KPF**

There's no mistaking the clean, pleasing pole top appearance of KPF switches—the original "straight-through" design. This design means lower cost, trouble-free service, no lubrication, virtually no maintenance. Installation may be made in the air or on the ground, on hot or dead lines, with phase units in horizontal, triangular or vertical array. Installation time is half that normally needed; no extra dead end insulators or heavy extra mounting structures are required.

Test install a KPF switch on your system this month.

KPF ELECTRIC COMPANY
Dept. W, 1624 E. Alpine Avenue
Stockton 5, California

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For phone number of closest representative see advertising index in back of book.

THE MAN WHO HAS TO KNOW,
R. H. PORTER, SUBSTATION FOREMAN
TELLS WHY . . .

DEPENDABILITY pays dividends for Appalachian Power's investment in General Electric Voltage Regulators

"We anticipate over 25 years' dependable service from our new G-E ML-32 step regulators installed in the last few months. The first modern step voltage regulator* ever built has been operating in our Roanoke District since 1932. It didn't need major maintenance until 1956."

Dependability means most reliable operation with least-possible maintenance. This is one reason why more G-E regulators are in use today than any other make. G-E tap changer samples are continuously being life-tested to assure you of over 25 years' normal service. This long-term extra value is yours through investment in G-E regulators.

G-E REGULATORS COST LESS ON THE LINE because you get continuing extra dividends . . . from **G-E DEPENDABILITY**—absolute minimum maintenance; in **G-E SERVICE**—routine or emergency; from **G-E RESEARCH**—superior regulating equipment. Result: Extra Values = **EXTRA PROFIT.**

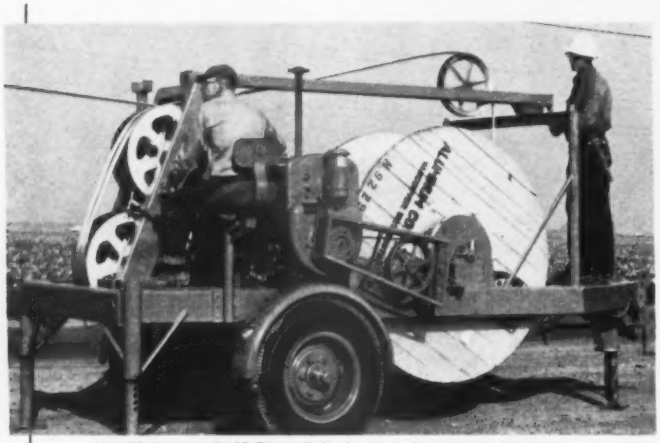
Only General Electric returns so much for your regulator investment. Ask your General Electric regulator representative to show you how. General Electric Co., Schenectady 5, New York. 423-35

** A G-E automatic step-type voltage regulator installed in the fall of 1932 on the Roanoke-Fincastle rural distribution line of the Appalachian Power Company near Roanoke, Va.*

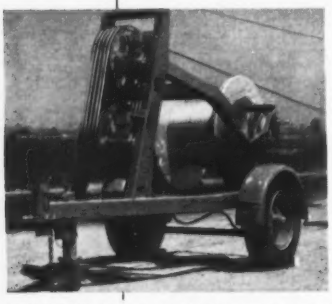
Progress Is Our Most Important Product

GENERAL ELECTRIC

Now—A budget priced **PENGO TENSION STRINGING "TEAM"** for faster, safer, lower cost wire stringing!



NEW PENGO 5500 BWCP TR-I bullwheel cable puller pulls single conductor or pulling line, at tensions to 1,700 lbs. at 3 mph in high gear, or to 3,100 lbs. in low. Takes reels to 44" wide by 69" diameter. Neoprene-lined bullwheels take manila rope to 1¼" diameter; or smaller pulling lines and conductors. Powered by 25 hp gas engine; 2 man operation. Ideal for use with PENGO 5000 series tensioners (see below).



PENGO 5000 STR-I-34 combination tensioner and reel dolly has Neoprene-lined bullwheels to take conductor sizes up through .96 (565, 500 CM), handles reels to 34" x 72". The PENGO 5000 STR-I-54 is similar but larger and stronger, for larger and heavier reels to 44" x 72"

Here's a chance to gain all the economy, speed and safety of *tension* wire stringing at an investment that won't strain your line construction equipment budget.

The new PENGO 5500 Bullwheel Cable Puller pictured above, teamed up with a PENGO 5000 series tensioner, gives you a wire-stringing combination that keeps the conductor in the air all the way, makes it easier and safer to string over energized lines.

PENGO tension wire stringing equipment is designed and built by those who *know* line construction from actual and successful experience. You'll be hours and dollars ahead to consult us *now* on planned line construction. We invite your inquiry.

New PENGO-MILLER Line Stringing Swivels

Special models of the well-known MILLER swivels have been redesigned specifically for tension line stringing use, through collaboration between Petersen Engineering Co., Inc., and Miller Swivel Products, Inc.

The result is a reliable, heavy duty swivel of proper dimensions to pass through stringing sheaves and bullwheel grooves easily, without damage.

PETERSEN
ENGINEERING CO., INC.
Santa Clara, California
Dept. F-4
Telephone AXminster 6-7712

B-8

Schreiber **Heffelman**

Officers Promoted

George A. "Skip" Schreiber has been appointed executive vice-president, and M. C. Heffelman was advanced to senior vice-president, by the board of directors of Public Service Co. of New Mexico.

Under the new management arrangement, Schreiber retains all his present duties and also will assist D. W. Reeves, president, with a number of his duties. Heffelman will be responsible for design, construction and operation of power plants and for power production operations.

► **Graham Holabird** has joined All-Brite Fluorescent Fixtures as assistant to the president, Charles Buchanan, and will have special sales and public relations assignments out of the Los Angeles headquarters. He will work out of the new All-Brite Monterey Park plant, which will be occupied in May. Holabird literally grew up in the electrical industry in the Western region and is one of its best-known figures. His father originated the Holabird Electric Co. that later became Westinghouse Electric Supply Co., and Holabird himself began his industry career with Western Electric in 1922. The company later became Graybar Electric Co. In 1929, he became San Francisco manager of Joslyn Pacific, and in 1930 joined National Electric Products sales staff in Pittsburgh,

Holabird

Pa. He became Western regional manager for National Electric in 1950, and in 1958 became assistant vice-president of the company.

► **Paul E. Paules** has been appointed Western regional sales manager for Beckman Instruments Division. Headquarters are Fullerton, Calif.

► **Glenn H. Clapp** has been named manager of the Butte apparatus sales office of Westinghouse Electric Corp. He replaces **Donald E. Kampschror,** who has been named assistant manager of the central Pacific apparatus district, with headquarters in San Francisco.

► **William L. Barbee,** manager of Okanogan County (Wash.) Public Utility District, has announced plans to resign effective April 30. Wayne Houston has been selected to assume the position.

Williams

Scoville

► **C. J. "Jess" Scoville,** superintendent of Portland General Electric's electrical maintenance and construction department for the past 15 years, has been named assistant to the general superintendent. Replacing Scoville is **Joe Williams,** formerly chief estimator, assistant distribution engineer and assistant to Vice-president Howard Arnett. Scoville has been with PGE for 36 years. His new duties will include developing substation construction standards and planning for new facilities. Williams joined PGE in 1948 after graduation from Oregon State College as an electrical engineer.

► **Roy Bevan,** an engineer for Sylvania Electric Products in Los Angeles, has been promoted to field sales representative.

► **Kocher, Bradford & Nishimura,** consulting engineers, are now occupying new quarters at 1206 S. Maple Ave., Los Angeles 15.

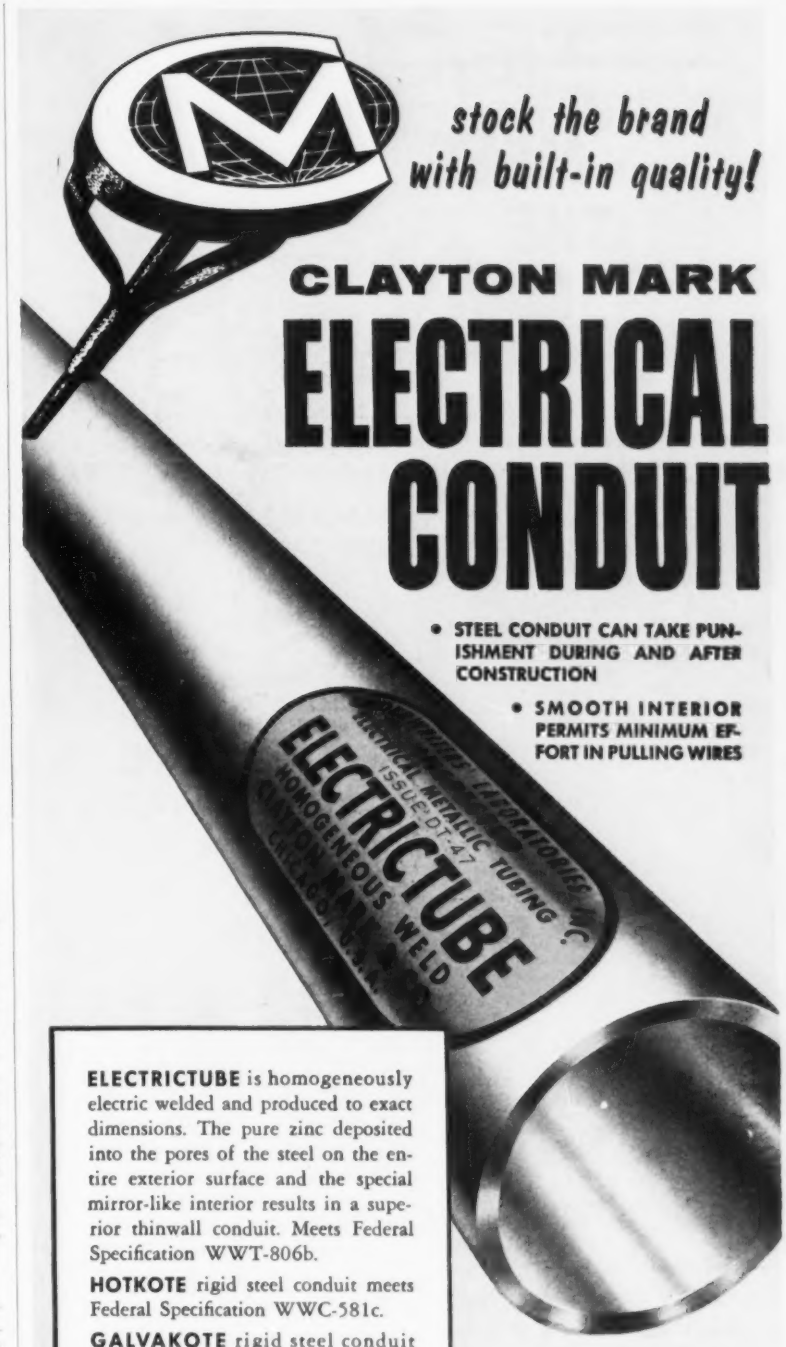
► **Emmett J. Fallon Jr.,** at one time with Fairbanks, Morse & Co. in San Francisco, has been named distributor sales manager for Jefferson Electric Co.

stock the brand with built-in quality!

CLAYTON MARK

ELECTRICAL CONDUIT

- **STEEL CONDUIT CAN TAKE PUNISHMENT DURING AND AFTER CONSTRUCTION**
- **SMOOTH INTERIOR PERMITS MINIMUM EFFORT IN PULLING WIRES**



ELECTRICTUBE is homogeneously electric welded and produced to exact dimensions. The pure zinc deposited into the pores of the steel on the entire exterior surface and the special mirror-like interior results in a superior thinwall conduit. Meets Federal Specification WWT-806b.

HOTKOTE rigid steel conduit meets Federal Specification WWC-581c.

GALVAKOTE rigid steel conduit meets Federal Specification WWC-581c.

ENAMELKOTE rigid steel conduit meets Federal Specification WWC-571a.

Each length contains Underwriters' Laboratories label and meets NEMA specifications.

CLAYTON MARK & COMPANY

1900 Dempster Avenue • Evanston, Illinois

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Are you burning a lot of midnight oil
when faced with tough wire
and cable problems?

MEET
THE
MAN
WHO CAN HELP YOU...
. . . on page 6

Need a Low-maintenance Answer on Photo-electric Street Lighting Controls?

WRITE
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FOR
COMPLETE
DATA

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DIVISION
RIPLEY COMPANY, INC., MIDDLETOWN, CONN.

Over 100 specialists bring you...
THE MOST NEEDED DATA
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ELECTRICAL ENGINEERING

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STANDARD HANDBOOK for ELECTRICAL ENGINEERS

Editor-in-Chief
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ELECTRICAL WEST SPECIAL REPORTS

Several times each year ELECTRICAL WEST uses one of its regular issues to put special emphasis on a particular phase of the Electrical Industry. For your reference here is what to expect along this line for 1959—

(1) Already published is the February issue which included the Annual Statistical Report. (A limited number of reprints of this report are available on request).
(2) April—Industrial Report
(3) June—Convention-in-Print Report
(4) August—Heating Report
(5) September—Lighting Report

For further information and copies of Statistical Report write:

ELECTRICAL WEST
68 Post Street San Francisco 4, California

Market Development

Essential Ingredient

"Let's put excitement back into selling here in America," Carl E. Lantz, vice-president for sales, Admiral Corp., suggested to about 400 appliance dealers, distributors and visiting manufacturers' representatives at the annual Spring Conference of the Bureau of Home Appliances at San Diego on March 5. "Nothing moves unless somebody makes a sale, and nobody makes a sale unless somebody gets excited," he continued. "Finding out what a customer wants, and filling his need, has become 'old fashioned' in some quarters. The essential ingredient has been left out—'excitement.' The customer is excited about fulfilling a need or he wouldn't be in the store. It is up to the salesman to meet this pitch of excitement to make the sale.

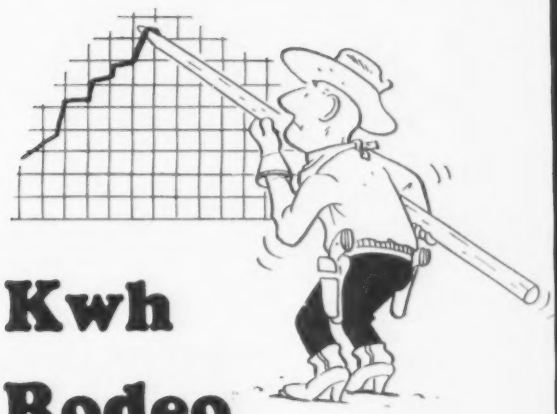
"The new law of the land is the 'spiff,'" Lantz contended. "It's time that law was repealed." The salesman could be the United States answer to Soviet economic aggression, said Lantz. He could be, that is, if he develops the courage and imagination to put excitement back into selling. Lantz stated that the order-taking lethargy of the typical American salesman is in direct contrast to the new enthusiasm of the Russians for selling on the world market.

Part of the fault may lie with educators and others who help to determine careers for young men and women, Lantz stated. He pointed out that in talking to a group of college seniors he found that none of them considered selling among the most exciting jobs in America today.

From a panel of manufacturers' representatives, members of the bureau and their guests heard "what's new for '59." Steve Upton, Western regional manager of RCA-Whirlpool, said that his firm intends to make gas refrigerators a major factor in the market, particularly through cutting the cost and the weight. Robert Thompson, sales manager, Home Products Division, Packard-Bell, predicted that the TV market will standardize on 18- and 23-in. tube sizes soon. M. A. Hoff, regional manager of Hamilton-Beach, said that dealers are getting increased profits from electric house-

Announcing

The Third Annual Kilowatt-hour Contest



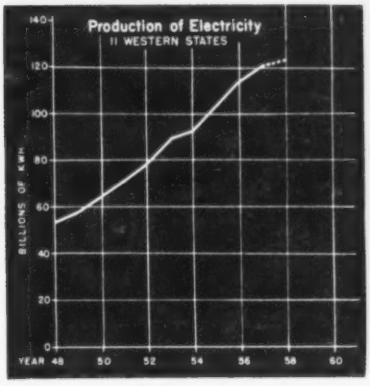
Electrical West's Kwh Load Forecasting Rodeo

A Chance To Put Your Brand on a $500 Block of Stock of a Western Utility

The Object—To forecast the total kilowatt-hour output of the power stations in the 11 Western states for the year 1959, giving reasons for the estimate in 25 words or less. Federal Power Commission figures of kilowatt-hour output will be the final authority.

The Contestants—Any person employed in any segment of the electrical industry in the 12 Western states or Hawaii may submit one entry in the contest—using the attached postcard or a reasonable facsimile thereof. Entries must be postmarked not later than June 30, 1959. Employees of the McGraw-Hill company and its subsidiaries are ineligible to participate.

The Prize—ELECTRICAL WEST will award the winner, who comes closest to the actual official FPC kwh output figure, $500 worth of common stock in one of the electric companies serving an area of the 12 Western states. The electric utility whose common stock will be the prize will be determined by a drawing held at the annual Pacific Coast Electrical Assn. convention in San Francisco, May 20-22, 1959. Stock representing the prize will be purchased immediately after the drawing and held in escrow with any accrued dividends until the winner has been determined. In case of ties, the prize will be divided equally between those submitting the winning figure.



A Hint—In 1958 the official kilowatt-hour output figure for the 11 Western states was 122,819,372,000 kwh as reported by FPC.

It's Fun—It's a game of skill—**and a test of your optimism about Western growth. Calculate what this figure will be for 1959! It costs nothing to enter the contest. Just send in your estimate on the attached card, by letter or other postcard.**

To ELECTRICAL WEST's Kilowatt-hour Contest Editor

Here's My Forecast

The annual kilowatt-hour output for the 11 Western states for the year 1959 will be ..... kwh.
Here's why (in 25 words or less). .....

.....

.....

.....

Name .....
Title or job .....
Company .....
Address .....
City ..... State .....

(Return before June 30, 1959)

Put *Your* Brand on $500 of Stock

Use this Card to Enter

ELECTRICAL WEST'S

—Kilowatt-Hour Rodeo—

See preceding page for details

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BUSINESS REPLY MAIL
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Electrical West's Kilowatt-hour Rodeo
68 Post Street
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Now you can weld a perfect, permanent electrical connection every time with

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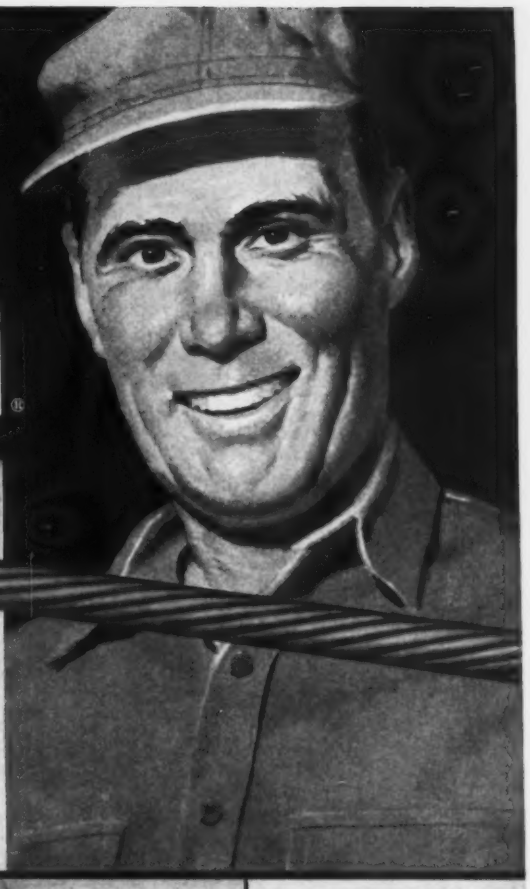
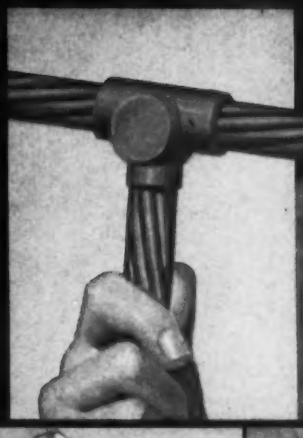
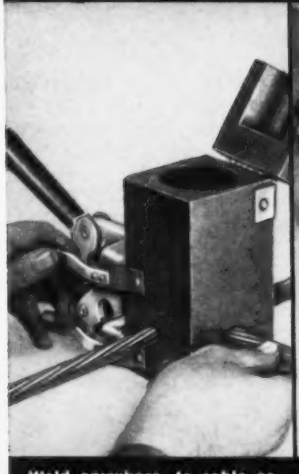


. . . connects easily and economically to any copper conductor or steel structure



Get a permanent THERMOWELD connection quickly...never corrodes or loosens, costs little to install. Current-carrying capacity higher than conductors.

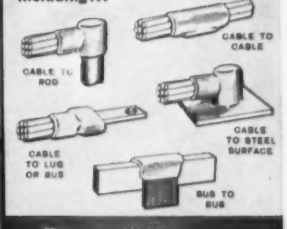


Weld anywhere, to cable or flat, with this compact, lightweight THERMOMOLD. Completely self-contained... needs no external source of power, no special skill.

Pour welding powder into mold, tap to release starting charge. Unique composition of starting charge prevents mixing with welding powder, assures positive firing. Slag easily removed.

Close cover and ignite charge with flint gun. Fast-burning powder fires every time. THERMOWELD reaction forms liquid copper which fuses conductors into a solid copper mass.

You can THERMOWELD almost all steel or copper connections, including...



THERMOWELD fires every time. Cartridges sealed in polyethylene envelopes with moisture absorbing silica gel. Starting, welding charges can't mix...full starting charge assures ignition.

All components are available from your local Burndy distributor. Ask him or your Burndy representative for a demonstration.

BURNDY

59-4

Norwalk, Connect. In Europe: Antwerp, Belgium Toronto, Canada

For phone number of closest representative see advertising index in back of book.

Crapo

GALVANIZED STEEL STRAND FOR GUY, MESSENGER and OVERHEAD GROUND WIRE

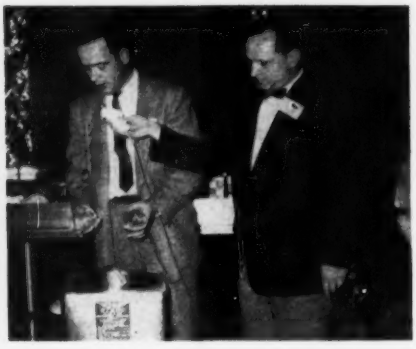
The high, uniform, consistently-dependable quality of Crapo Galvanized Steel Strand is the direct result of close laboratory control over each step in manufacture. All wires used in forming a particular size and grade are produced from steel of selected analysis, carefully processed under technical supervision and stranded on precision machines. Both wire and finished strand are subjected to prescribed laboratory tests to insure the desired end result.

Heavy, uniform, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide maximum resistance to corrosion.

Write for booklet OG-25 containing "Sag and Tension Data for Overhead Ground Wire."

INDIANA

STEEL & WIRE CO., INC., Muncie, Indiana



Speakers at North Bay Commercial Cooking Show: left, George Klopp, Hotpoint; right, Dewey Cahill, Stero Dishwashing Machine Mfg. Co.; Alex Marchisio, Marco Supply Co.

wares but they are not yet as high as the dealers' need. From Frigidaire's Frank Hickey, the conference heard that business in the new year will go to the dealers who do something different from their competitors.

Included on the bureau's program for the sales conference was a panel of prominent San Diegans who discussed the present and future outlook for industry and business in that community. Advertising plans of the bureau in cooperation with the San Diego Gas & Electric Co. were outlined for the year.

Model Medallions

Three Gold Medallion all-electric homes were put on exhibit in Blossom Hill Glen tract in northern California by **R. H. Manfre,** general contractor, in cooperation with the advisory committee for the electrical construction industry of Santa Clara and San Benito Counties. A preview showing was held for the electrical and building industries.

The houses are complete with electrical heating, a different method being used in each of the three, a complete electric kitchen and laundry and a "Lighting for Living" installation.

► In line with its policy to move into expanding market areas, **California Electric Service** has opened its ninth authorized factory traffic appliance service branch at Covina, Calif. Located at 650 S. Second Ave., the branch will operate as a substation of the Pasadena office, according to Keith Chamblin, vice-president. Harry Watson is Pasadena manager and Covina supervisor. John Jeffries, who was operating manager in Pasadena, will manage the Covina branch.

Commercial Cooking Show Brings Prospects

More than 200 came to look and to buy at the Commercial Electrical Cooking Equipment Show and Open House sponsored by Pacific Gas and Electric Co.'s North Bay Division at the Flamingo Hotel in Santa Rosa, Calif. More than $1,000 worth of equipment was sold on the spot and there is good evidence that an additional $5,000 volume will be closed as a direct result of the two-day promotion.

Eighteen manufacturers, distributors and retailers sent representatives to demonstrate and sell to prospective buyers—management people representing restaurants, schools, hospitals and sanitariums.

Two special "sit down" equipment demonstrations were scheduled on the first afternoon and evening and because of their popularity a third was held on the second afternoon. Among those exhibiting were: Foster Refrigerator, Hobart, Hotpoint, Stero Dishwashing Machine, Wear-Ever and Wells Mfg. Co.

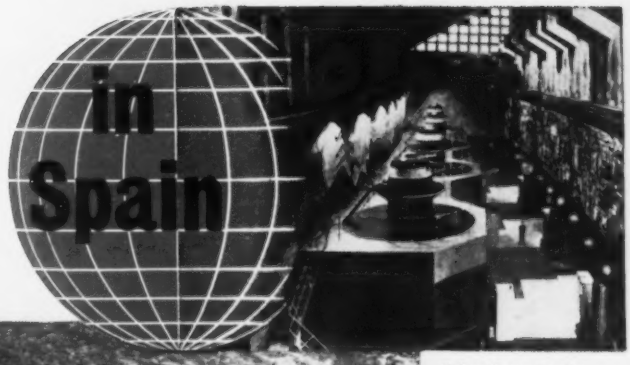
More than $50,000 worth of electric equipment was on display with more than 40 kw of it connected for "live" demonstration, according to E. S. Day, division manager.

T. F. Davis of the San Rafael office handled details for PG and E.

► **Glenn Stukey** of the Yampa Valley Electric Assn. of Steamboat Springs was re-elected president of the Colorado Farm Power Council.

► Montana Power Co. has applied to the U. S. Patent Office for service-mark protection on the Electrical Tuesday and Electro-Day concepts and their identifying symbols. Electro-Day is the name now being used in this promotion to give greater flexibility.

The world over...



Salime Power Station—all generating plant, transformers, switchgear and control gear.

Priest Rapids Power Station, Washington — ten 114,000 h.p. water turbines and associated 83,000 kVA generating equipment, with five 183,000kVA, 13.2/230kV transformers.

Hirakud Power Station—two 52,000 h.p. vertical feathering propeller turbines and alternators — the largest of their type in India.

'ENGLISH ELECTRIC' water turbines and generators have been installed throughout the world. At three major schemes in the United States, 'ENGLISH ELECTRIC' hydro-electric equipment will be adding some 1,630,000 h.p. to America's power potential.

'ENGLISH ELECTRIC' products cover all aspects of the generation, transmission and utilization of electric power. Service facilities are available through three large Canadian plants. Contracts have been completed and are in course of manufacture for many other major American power projects.

'ENGLISH ELECTRIC'

Agents for Washington, Oregon, Montana, Idaho, Wyoming, Nebraska, California, Arizona, Utah, Nevada and the Alaska territory: **James I. Metcalf & Co. Inc.**, 701 United Pacific Building, Seattle 4, Washington. Branch offices in San Francisco, Los Angeles, Portland, Phoenix. Agents for Georgia, Alabama, Tennessee, South Carolina, Florida and Kentucky: **Osgood & Associates, Inc.**, 988 Spring St., N.W., P.O. Box 7383, Station C, Atlanta 9, Ga. Agents for Louisiana and Mississippi: **Electron Equipment Co. Inc.**, 1050 Constance St., New Orleans, 13, La. Agents for Texas, Oklahoma, Arkansas and New Mexico: **Peabody Bros.**, 2903 St. Louis St. at Oakland, Dallas 26, Texas. Branch offices in Houston and Tulsa.

Enquiries for territories not covered by Agents should be directed to:

ENGLISH ELECTRIC EXPORT & TRADING CO. LTD., 750 THIRD AVENUE, NEW YORK 17, N.Y. Telephone: MURRAY HILL 7-0303

OC US 2

For phone number of closest representative see advertising index in back of book.

Keeping line clearance costs DOWN goodwill UP

Proven power equipment and Davey trained rope climbers . . . that's what makes Davey Surgical Line Clearance so economical. Utilities can rely on the dependable, efficient, and *adaptable* Davey crew. It will pay you to talk over your tree maintenance problems with the West's leading line clearing specialists—Call Davey.

DAVEY
TREE SURGERY CO., LTD.
OF CALIFORNIA

SAN FRANCISCO • Russ Building
LOS ANGELES • Story Building

Are you making a lot of frantic phone calls when a single call to the right man would serve all your wire and cable needs?

MEET THE MAN
WHO CAN HELP YOU...

. . . on page 6

LOOK IT UP FIRST
in Electrical West's
BUYER'S GUIDE AND DIRECTORY

1959 Edition sent to all subscribers in November. Extra copies available $1.00 each. Write to Circulation Mgr., Electrical West, 68 Post St., San Francisco 4, Calif.

For phone number of closest representative see advertising index in back of book.

White

Huckins

Changes at Utah Power

Pending his retirement next December, **William A. Huckins,** manager of Utah Power & Light Co.'s business development department, has moved upstairs in the company's new building to the staff of President **E. M. Naughton. Darcie A. White,** who has been Huckins' assistant, was made department manager.

With the company 46 years, Huckins has been active in all industry activities in the Rocky Mountain area. White joined Utah Power & Light in 1950 and served as salesman and sales supervisor before he became assistant manager of the business development department in 1956. He is a graduate in electrical engineering of the University of Utah.

LBE for Life

A unique project in Boise, known as the Clover Sunrise Manor Retirement Homes, is being built by private capital. The project, covering three acres, will consist of two-bedroom, all-electric Gold Medallion Homes (11 have been completed) and a nursing home.

When an old couple buys a home, a contract to take care of them for life goes with it. They leave the home to the organization so that it may be sold after their death to another such couple.

A similar group of homes is projected for Salmon, Idaho. Because of its greater safety, electricity was selected for all of the services, including heating.

► **Ted Shepherd** is now sales promotion and planning supervisor, and Roy Kreyser is illuminating engineer, in the new organization of the Los Angeles Department of Water & Power, general sales division.

► **Dale Brown** has joined the J. R. Christensen Agency of Salt Lake City as a salesman. He has been a resident salesman for General Electric Co. for the past 10 years and is well known throughout the intermountain area.

Rinker Retires

George A. Rinker retired on March 1 as manager of Ramsay Appliance department of American Factors and is succeeded by **Hall H. Hoxie.** Others given executive appointments are **Cyril McQuillan,** director of sales promotion, **J. G. Kummer,** office manager, **Walter H. Camp,** sales counselor for TV and hi-fi.

Rinker

Rinker was in Columbus, Ohio, with Bard Inc., G-E distributor, before he went to Hawaii in 1949 as a civilian employee of the U. S. He joined Ramsay in 1944 and became manager in 1954. He was chairman of the Electrical Living Committee, PCEA Hawaii, for four years and of the Electrical Development Committee two years.

During Rinker's five years with Ramsay, volume of business has almost doubled and the department has consistently been G-E's No. 1 independent distributor in the United States, according to **Willard L. Doering,** Amfac vice-president. After a three-month trip to the mainland, he expects to start a small real estate business.

Electric Heat Cheaper

After a public hearing on the merits of electrical vs oil heat, the Tacoma School Board indicated March 5 it would approve the architect's choice of an electrical heating system for a new high school.

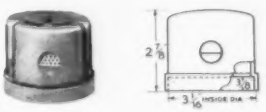
Architect **Robert Price** estimated that the initial cost of an electrical system would amount to only $38,100 as against $79,000 for a "wet heat" installation. Annual savings would range from $2,141 to $5,904, he estimated.

Proponents of oil heat proposed that bids be called for both types of systems but the architect declared preparation of another set of drawings would cost at least $18,000.

► **Marguerite Hickey** has resigned from the Western Merchandise Mart staff at San Francisco to join the Northern California Electrical Bureau. Mrs. Hickey, who had been the Mart's advertising and publicity manager, was active in promoting the recent Market Week Country Fair nights and the electrical industry luncheon at the 1959 Winter Market.

...WILL IT FIT?

The recently adopted EEI-NEMA standard, spelling out mounting specs for twistlock controls and their receptacles, should eventually prove a boon to everyone in the industry. Like any other well-thought-out standard, it can help make more controls and luminaires go together and work the way they should. Not the least of the benefits should be the elimination of a lot of force-fit remodeling and cussing up on the pole . . . We think the people who established this standard are to be congratulated.



As for the newest F-P control design, the tubeless 6600A Series, we're glad to say it complies fully with the new standard. The little sketch shows what 6600A dimensions are involved, and the photo shows the alignment of the CdS cell with respect to the plug blades. Since the standard also calls for an effective seal between the control and the luminaire head, we are now supplying 6600A's with a sponge rubber gasket on the base plate to do this job. To take care of luminaires designed for gasket-less controls, however, the pressure-sensitive stickum on our gasket permits quick and painless removal. (They're no good on mason jars, but work great balancing a coffee cup on your knee.)

If you're wondering how you can put controls on luminaires you now have in service and still make the installation conform with the new standard, maybe we can help. One of the numerous mounting styles or adaptors in the 6600A Series could be just the ticket. A call or letter will get the ball rolling. The Fisher-Pierce Co. 43 Pearl St., So. Braintree 85, Mass.

FP

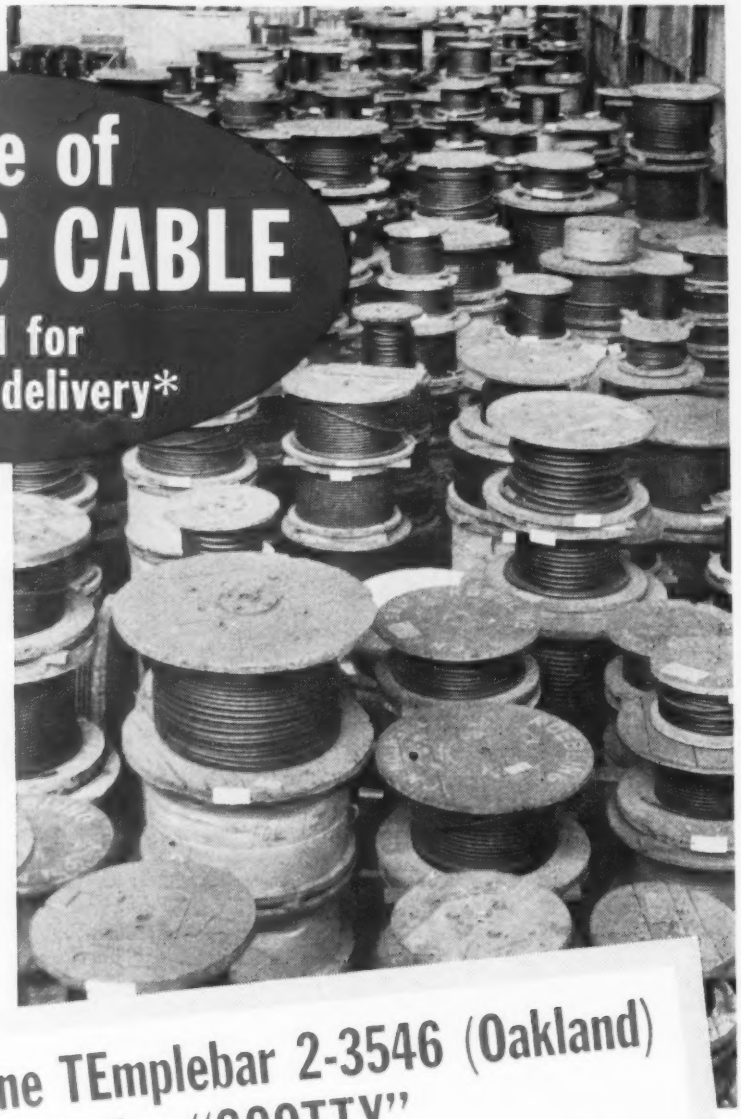
FISHER PIERCE

PHOTOELECTRIC LIGHTING CONTROLS

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

For phone number of closest representative see advertising index in back of book.

½ acre of ELECTRIC CABLE on hand for immediate delivery*



- High voltage cable
- Heavy duty power cable
- Multiple conductor control cable
- Flexible cords and cable

NAME YOUR SIZE AND LENGTH ...WE SHIP TODAY!

Iron-clad guarantee of quality!

Phone TEmplebar 2-3546 (Oakland) and ask for "SCOTTY"

"I take your phone order personally and see that it is processed and shipped exactly to your specifications"

*We're not suggesting you need ½ acre of cable but if your requirements are for 10 ft., 10,000 ft. or 100,000 ft. you receive the same prompt service and the stock of cable you select from is second to none. Write for current listing of sizes and specifications.

WC WILLIAM CERESKE company electric wire and cable

1401 MIDDLE HARBOR ROAD • OAKLAND 20, CALIFORNIA

Manufacturers—Distributors

Ray Waggoner (center) has returned to San Francisco as Hubbard's vice-president in charge of West Coast operations, a post he left two years ago to take a major role in company operations in the East and Middle West. With him here are F. H. Kissner (left), board chairman, and Charles H. Dyson, president, of Hubbard. Waggoner is a member of Hubbard's board and of its executive committee

New SF Office

Pacific Union Metal Co. of Los Angeles, subsidiary of the Union Mfg. Co. of Canton, Ohio, has set up a sales office in San Francisco, with **Charles G. Strom** as manager. The new office, which has headquarters at 127 Montgomery St., will be known as the Northern California-Northern Nevada district of Pacific Union.

Strom

As partner in the former Taper Tube Pole Co. of San Francisco, Strom has handled street lighting sales. A graduate of the University of California, he was on active duty in the Navy and aboard a tanker in Pearl Harbor at the time of the Japanese attack; was wounded in the battle of Saipan in June 1944.

New Regional Set-Up

A change in marketing concept announced by Cutler-Hammer at its December management conference has resulted in a new regional field sales setup. In the West, **R. C. Seibert,** former Los Angeles district manager, becomes Western regional manager, with responsibility for the Denver, Los Angeles, San Francisco and Seattle districts.

W. H. Palin, in the Los Angeles office since 1954, has taken over the district managership. **C. W. Ludvigsen,** former San Francisco district manager, was transferred to Milwaukee headquarters as manager of systems control sales, and **C. M. McElroy** was brought from Denver as his San Francisco replacement. Reporting to McElroy are **J. G. Fore,** Fresno; **M. J. McCauley,** Medford; **M. D. Clough,** Sacramento.

At Denver, **M. C. Larson,** formerly of Baltimore, is in charge. The Salt Lake City office, a part of the Denver district, is headed by **D. W. Bentley.**

The Seattle district, headed by **J. T. Riday,** includes Portland and Spokane. **F. J. Woldrich** is in charge at Portland, **R. J. Murphy,** at Spokane.

Cutler-Hammer has plants at Los Angeles and San Francisco.

Marketing System Realigned

Switch from a product- to a market-oriented sales organization has been announced by G-E's Instrument department through its general manager, **E. E. Parker,** who said that the wide range of products handled demanded a change from conventional techniques.

The setup includes two new sales groups: the industrial and electric instruments sales and the instrumentation equipment sales and product planning subsections. Units within the groups handle marketing of applicable products, one to distributors, one to original equipment manufacturers and another to electrical utility and industrial users.

Associated Moves

After more than 30 years at the same location in Los Angeles, Associated Wholesale Electric has moved, taking over the former Graham-Reynolds plant in the heart of the industrial area, at a cost of $250,000.

Strategic location was the primary reason for the move. However, the new plant also affords Associated the benefits of more warehouse space, all on one floor, with ample loading dock. Should the firm wish to expand, the site lends itself to an underground parking facility that would permit construction of additional warehouse space.

Associated spent upward of $50,000 in remodeling the plant, including air conditioning and general modernization. With the move, the firm anounced that it is seeking new lines, especially in the heavy industrial and construction fields, in order to expand its philosophy of diversification.

Management Change

Directors of Norris-Thermador Corp. elected **William E. Cranston** president, replacing **Kenneth T. Norris,** who became chairman of the board. Cranston is one of the founders of Thermador Electrical Mfg. Co. and has served as vice-president and executive vice-president of Norris-Thermador since the acquisition of Thermador by Norris in 1950.

Cranston

Norris will remain active in the company's affairs but will be concerned primarily with matters of policy and with a program of expansion by acquisition.

Directors also voted to construct an addition to the Vernon, Calif., plant to house executive offices. These are expected to be ready for occupancy in mid-July.

► Triad Transformer Corp. has appointed **Miles Wagner** as its Arizona representative. His address is Route 4, Box 940, Tucson.

► **Donald E. Ingalls** has gone into business for himself at 1485 Bayshore Blvd., San Francisco, and is representing Lapp Insulator Co. He formerly was with C. E. Ingalls & Sons, which continues its business in the Monadnock Bldg.

Two mobile vans have been put in operation by Kaiser Aluminum & Chemical Sales to show how to handle aluminum conduit. Equipped with all tools and supplies for cutting, bending and threading aluminum rigid conduit in standard sizes, the demonstration trucks are visiting electrical contractors, distributors, utilities, plants. Inside displays feature conduit fittings and accessories made by well-known firms. A public address system takes care of demonstrations to large audiences

Elects New Officers

S. T. Bell, executive vice-president of Gough Industries, Los Angeles, announced the election of **Mrs. P. G. Gough Sr.** as president of the corporation, a post left vacant by the death of her husband last December. Bell will be chairman of the management committee.

Two other executive appointments were announced at the same time. **J. R. D. Beasley** is vice-president and **P. G. Gough Jr.,** vice-president and director. No policy changes are anticipated, Bell said.

Founded in 1912, Gough has three divisions—Electrical Supplies & Apparatus, Appliance and Automotive—and several branches.

► **Conrad R. Strassner Co.** has announced separation of its distributor and industrial divisions. Two new companies have been formed: Richard A. Strassner Co., 1557 N. Western Ave., Los Angeles 27, and Ellard E. Strassner Co., 1865 N. Western Ave., Los Angeles 27. The former will handle industrial accounts and government agencies, the latter sales to distributors and hi-fi accounts.

► A new firm, Wrathall & Krusi Inc., has been formed by **LeRoy E. Krusi** and **James L. Wrathall.** With offices in the Monadnock Bldg. in San Francisco, the company is representing Anderson Electric, Bishop Mfg., Pfaff & Kendall, Malleable Iron Fittings and Subox. It has also taken on the Seculate anti-condensation compound marketed by British Lead Mills Ltd. of London.

► Jones & Laughlin Steel Corp. is marketing carbon electrical steels under the trade name Jalox. They are made in the company's new basic oxygen furnaces, according to the announcement by President **Avery C. Adams.**

Earnings

Despite lower sales in 1958 as compared with 1957, **Allis Chalmers** reports improved earnings. Net earnings after preferred in '58 were $19,235,127, or $2.34 a common share; in '57, $17,353,653, or $2.11. Sales in 1958 totaled $531,972,829, in 1957, $534,146,214.

For a 13-week period ended Jan. 31, **Emerson Radio & Phonograph** and subsidiaries reported net profit of $1,279,168 before taxes. After provision for federal income taxes, this amounted to $627,468, or 31c a share as compared with $297,699 and 15c in the same period last year.

A 27% decline in sales and net loss of $423,495 after tax credits were reported by **Schick.** Net loss after special charges in connection with management changes and conversion to direct-selling distribution was $986,870. In 1957 net profit was $1,352,530.

Philco reported sales down about 6% in 1958, taking the year as a whole. Sales for the last half, however, were 7% above, with the first half falling 19% below the comparable period in 1957. Total '58 earnings were $2,874,000 as compared with $4,081,000 in '57.

Pyle-National's net sales in 1958 were more than $13,000,000 as compared with $8,797,460 in 1957. Although the figure includes five months of sales by the recently acquired Steber Mfg. Co., increase for the parent company alone was about 25%. Earnings per share hit an estimated $4.20, up from $2.37 in 1957.

► **Ted C. Eberts** has been named to the post of district sales manager in southern California for Hamilton Beach Co. Past experience includes an association with Barker Bros. department store in Los Angeles, and advertising and sales assignments with General Electric Supply Co. in the same city. He will headquarter in Los Angeles.

Eberts

President R. D. Nelson of R T & E Corp. and L. D. Barre, marketing manager, look over the first Terra-Tran transformer, designed by the company especially for low-cost underground installations

1894
First Kuhlman transformer produced within a decade of first transformer introduced in USA.
1915
Established now as a leading transformer manufacturer, Kuhlman made this in World War I days.
1925
This was the characteristic shape of the welded tanks of the Twenties.
1940
Another big step. Rounded tanks and hand grip connectors were universally used by World War II.
1935 Patent applied for in 1929, marketed in 1935, the Kuhlman "Bent Iron" Core revolutionized transformer design.
1959 Serving industry in its 65th year, Kuhlman introduces smaller transformer with lower losses.
KE
TODAY, RESEARCH IS SHAPING THE TRANSFORMER OF THE FUTURE

65 YEARS OF KUHLMAN PIONEERING ACHIEVEMENT . . .

has seen the transformer change as radically as the automobile

Changes in outward appearance have been many and drastic. The compact, sleek and functional shapes are a far cry from the clumsy cans of early day transformers.

More important changes, of course, have taken place inside the tank. New engineering developments, new design concepts, new material utilizations have come thick and fast for improvement in transformer appearance.

Chief among Kuhlman's contributions to the modern transformer is the "Bent Iron" core, first marketed by this company in 1935. This revolutionary concept took advantage of grain-oriented steels to raise overall efficiency, cut losses, improve service life, and open the way to smaller core and coil assemblies.

Kuhlman has made many other contributions to transformer progress. Today, in its 65th year of service, our research and development staffs are working on new and exciting breakthroughs.

Watch for news from Kuhlman!

KUHLMAN
ELECTRIC COMPANY

General Offices—Birmingham, Michigan
Western Division—Salinas, California

For phone number of closest representative see advertising index in back of book.

Earl S. Condon
COMPANY
Engineering Representatives

- Burndy Corporation
- Kaiser Aluminum & Chemical Sales, Incorporated
  (INSULATED ELECTRICAL WIRE PRODUCTS AND ALUMINUM CONDUIT)
- Hughes Aircraft Company
  (PRODUCTS DIVISION)
- Lapp Insulator Co., Inc.
- Preformed Line Products Company
- Lotran, Inc.

3450 Wilshire Blvd., Los Angeles 5, Calif.
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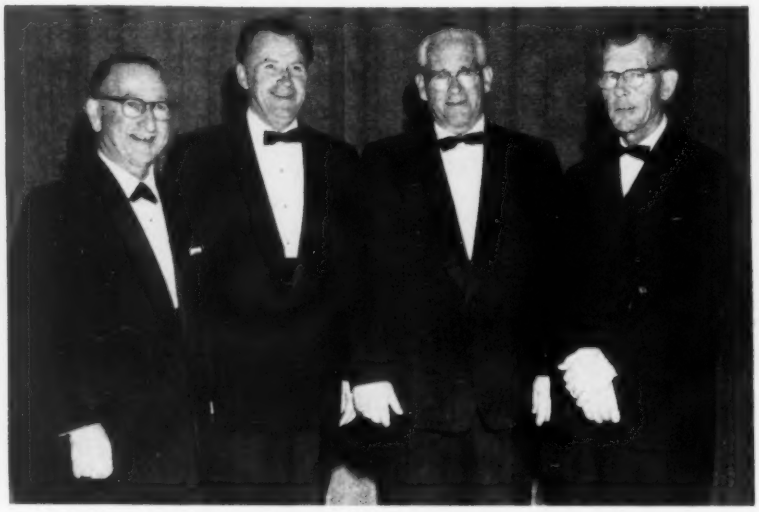
Association Affairs



Real class—dinner jackets and the Beverly Hilton—distinguished the inauguration of the Los Angeles Chapter, NECA, officers at the 10th annual Ladies Night. More than 450 attended, all contractors and their wives. Above, the top officers, A. L. Berg, president; Stanley R. Brekhus, vice-president; J. B. Shamel, treasurer; and Richard E. Arbogast, governor. Special guests included J. D. O'Connor, District 9 vice-president; George Seaman, District 5 field representative, Fort Worth; Charles Scholibo, Houston, now moving to San Francisco; and Dex V. Jewett, District 9 field representative

Rocky Mountain Electrical League officers who will guide the annual spring conference in Denver, April 19-22: E. J. Nelson, Alcoa; Earl Armstrong, Colorado Central Power; J. E. Wilson, Colorado Central Power; R. T. Person, Public Service Co. of Colorado; and James A. Chapman, Rawlins Electric; H. A. Mitchell and L. Dwane Wolrafen, not present

Are you wasting all kinds of time selecting the right wire and cable for your job?

MEET THE MAN
WHO CAN HELP YOU...

. . . on page 6

For phone number of closest representative see advertising index in back of book.

NWPPA

Northwest Public Power Assn. will hold its annual Engineering and Operations Section meeting at the Ephrata Recreation Center, Ephrata, Wash., April 9-10, according to Gus Norwood, executive secretary. A full program of technical subjects is anticipated, with many industry specialists contributing ideas and experience. Norwood also gave the dates for the annual Power Use Workshop, the commercial aspect of the operation, as Sept. 16-18, again at Ephrata. The Accounting and Finance Workshop is scheduled for Sept. 30-Oct. 1 at Clark County PUD Community Center, Vancouver, Wash. The annual general membership meeting this year will be held for one day only, May 25, immediately ahead of the national convention of the American Public Power Assn., May 26-29, at the Olympic Hotel, Seattle.

NAED

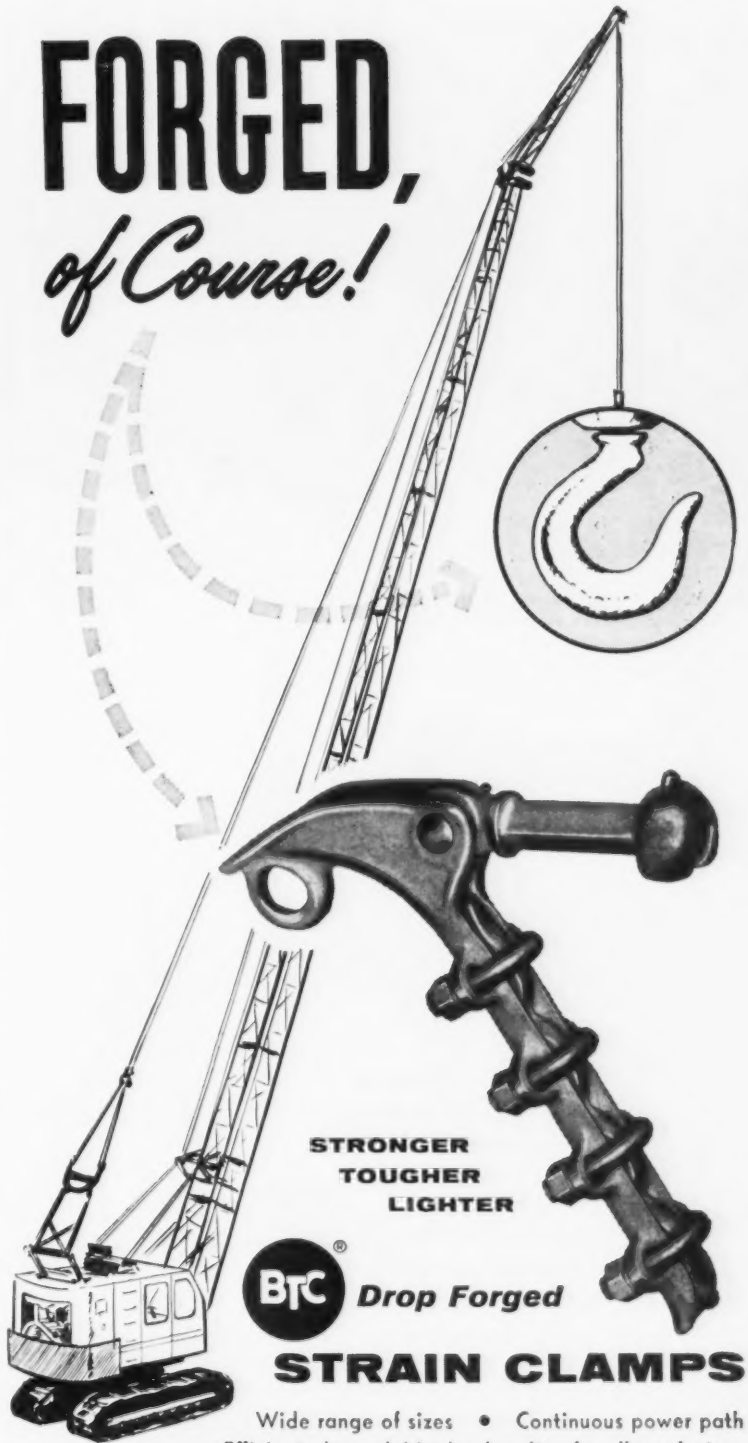
Again the Ken Rehwaldt-Ed Ross "How Not to Sell" superproduction was called upon to teach a sales lesson as well as to amuse a top-level group of distributor executives. This time it was for the northern California area meeting of National Association of Electrical Distributors, held March 12 at the Villa in San Mateo.

Its premier at the southern California NAED area meeting at Palm Springs last November was such a success that Vern S. Cooper, General Electric Supply Co., program chairman for the San Mateo meeting, imported it and the idea of a panel to discuss the merits of distributor salesmen.

A. H. Gudie, president, Biddle Trade Publishing Co., who did the same at Palm Springs, preceded the skit with a talk on the great need for better selling. After the skit, showing how bad salesmanship can be, Gudie moderated a panel consisting of a contractor, utility, industrial and retailer customer of distributors to get their opinions as to salesmen and their manners.

The well coordinated program developed by Vern Cooper began with a compact view of the business market potential for the area given by J. S. C. Ross, residential manager, and John S. Walsh, area development manager of Pacific Gas and Electric Co. It then flowed

FORGED, of Course!



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STRAIN CLAMPS

Wide range of sizes • Continuous power path
Efficient, dependable dead-ending for all conductors
Easy and economical to install — no special tools
Specify the best — BTC Hi-Line Hardware

THE BREWER-TITCHENER CORPORATION
HI-LINE HARDWARE DIVISION • CORTLAND, N.Y.

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QUICKLY Installed
TOUGH For long life

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EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

for the LONG PULL
use
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Only Y-ER EAS has all these features

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- Prevents sticking or setting. Specially helpful on saddles and turns.
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- Never harmful to hands or clothing.
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1329 Willow St.
Los Angeles 13
Phone: Madison 4-8801

ELECTRO COMPOUND CO.
4148 W. 150th St., Cleveland 35, Ohio

Are you wasting all kinds of time selecting the right wire and cable for your job?

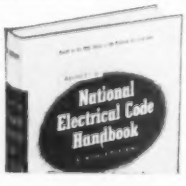
MEET THE MAN WHO CAN HELP YOU...

... on page 6

Now in Revised 9th Edition!

ABBOTT'S NATIONAL ELECTRICAL CODE HANDBOOK

Here is the electrical contractor's job book, completely revised to conform with the 1956 Code requirements—designed to help you understand and do work in accordance with the National Electrical Code. In this handbook you will find explanations of rules and measurements for the various types of jobs—what they mean—how to apply them. Wherever a ruling lacks clarity, it is carefully reviewed and its application explained. Diagrams, sketches, and illustrations used freely. 9th Ed. Revised by C. L. Smith. 642 pp., 394 illus., 34 tables, $9.00.



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through the need for salesmanship, the lack of it shown in the skit, the customers' views regarding distributor salesmanship and on to the NAED sales training course available to all members.

Members of the panel were A. E. Lagerquist, Standard Oil Co. purchasing department; R. E. Sanford, Hale's Television & Appliances; George W. Abbett, Abbett Electric Co.; and R. E. Machersie, PG and E purchasing department. Charles M. Newbill, Graybar Electric Co., presented the NAED sales course.

At the afternoon session, management problems of distributors were the order. G. W. Morelock, secretary of the electrical industry credit men's group, spoke on management of credit and collections for profit.

Jack O. Vance, McKinsey & Co., analyzed a system of planning to bring profit improvement by giving better current indices of the profitability of various commodity groups. William Jewell, Western region manager, concluded the lively meeting with a report on NAED affairs and plans for other area meetings and the annual conventions.

Electric Clubs

► **San Francisco Electric Club** made its change of officers on March 2 when C. H. Sedam, manager of station construction, PG and E, was inaugurated to succeed C. W. Leihy, editor and publisher of ELECTRICAL WEST. Directors elected for a two-year term were: Karl Bausch, Bechtel Corp.; Bill Call, Graybar; Dave Roach, Westinghouse.

► **San Mateo County Electric Club** regretfully accepted the resignation of Robert Frank, assistant manager of the San Francisco Electrical Contractors Assn., as its secretary when Frank ceased to be connected with the Peninsula Electrical Contractors Assn. as it set up a new San Mateo Chapter of NECA. President Mike Wright, Ets-Hokin & Galvan, appointed Tom Bland of Dahl Beck Electric as temporary secretary. The club devoted its March meeting to a tour to visit the atomic energy plant of PG and E at Valecitos.

IAEI

Dates of the series of annual meetings of the Nevada, Utah and Idaho chapters of International Association of Electrical Inspectors have been confirmed as: Nevada, April 17-19 at Winnemucca; Utah, April 20 at Salt Lake City; Idaho, April 22 at Blackfoot, Colonial Motel.

SEE AND HEAR

Meetings Calendar—1959

APRIL

6- 9—*Rural Electric Generating Co-operatives*, 10th annual operating conference, Hilton Hotel, Albuquerque.

8- 9—*PCEA*, Administrative Services Section conference, Hotel Lafayette, Long Beach.

9-10—*Northwest Public Power Assn.*, Engineering and Operating Section, annual meeting, Ephrata Recreation Center, Ephrata, Wash.

17-19—*International Association of Electrical Inspectors*, Nevada Chapter, Humbolt Hotel, Winnemucca.

19-21—*Rocky Mountain Electrical League*, spring conference Continental Motor Hotel, Denver.

20—*IAEI, Utah Chapter*, Newhouse Hotel, Salt Lake City.

22—*IAEI, Idaho Chapter*.

22-24—*Northwest Electric Light & Power Assn.*, Engineering & Operating Section, Personnel and Safety Section, Purchasing Committee, Hotel Utah, Salt Lake City.

24-25—*Rocky Mountain Electrical Manufacturers Representatives Club*, Electrical Exhibit, Tower Merchandise Mart, Denver.

24-29—*Bureau of Home Appliances of San Diego County*, Spring Fair, Balboa Park, San Diego.

27-29—*National Assn. of Lighting Maintenance Contractors*, annual conference, Hotel Cosmopolitan, Denver.

MAY

6- 8—*Institute of Radio Engineers*, regional conference and trade show, University of New Mexico, Albuquerque.

11-12—*Illuminating Engineering Society*, Intermountain region conference, Hotel Continental, Denver.

18-20—*NELPA*, Business Development Section, Advertising and Public Relations Committee, Rate Research Committee, Multnomah Hotel, Portland.

20-22—*PCEA*, annual convention, Hotel Fairmont, San Francisco.

24-27—*AIEE-ISA-ARS-IAS*, Telemetering Conference, Brown Palace and Cosmopolitan Hotel, Denver.

25—*Northwest Public Power Assn.*, annual membership meeting, Hotel Olympic, Seattle.

26-29—*IES*, Pacific Northwest region conference, Banff Springs Hotel, Banff, Alberta, Canada.

26-28—*American Public Power Assn.*, annual national convention, Hotel Olympic, Seattle.

JUNE

4- 6—*NELPA*, Accounting and Business Practice Section, Finlen Hotel, Butte.

21-26—*American Institute of Electrical Engineers*, Pacific general meeting, Hotel Olympic, Seattle.

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the dramatic story of
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See the new 16mm sound and color movie "The Hubbard EHD Faultmaster" right from your own desk chair. Film time: ten minutes.

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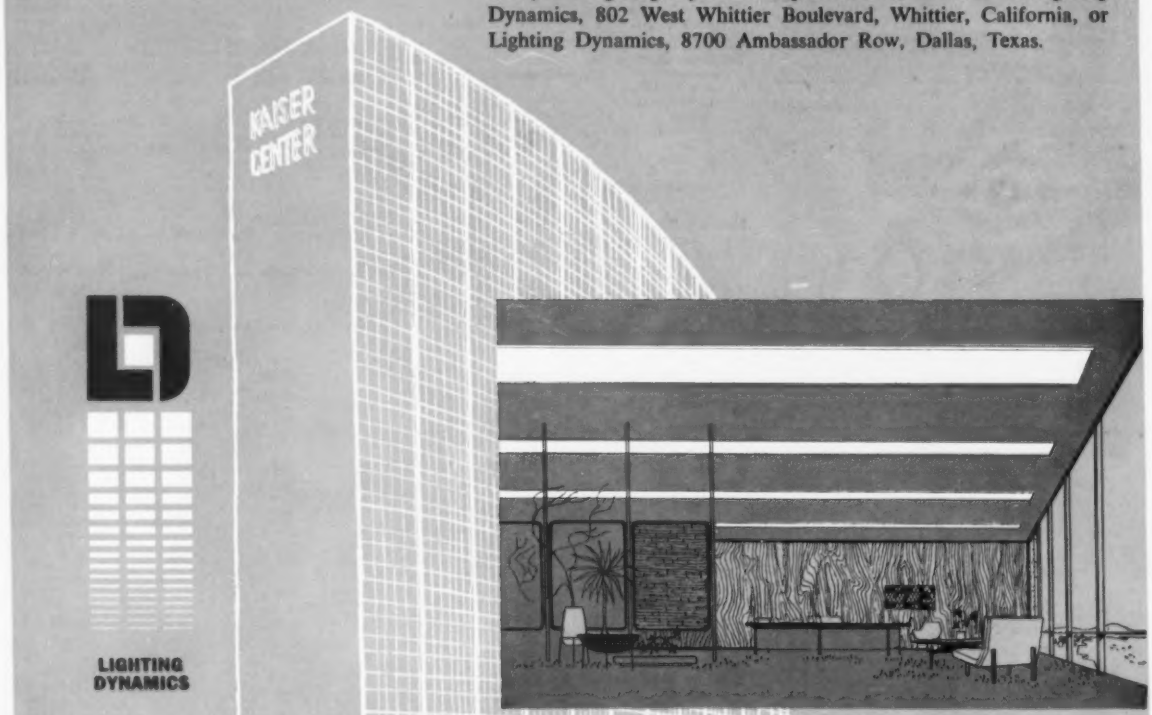

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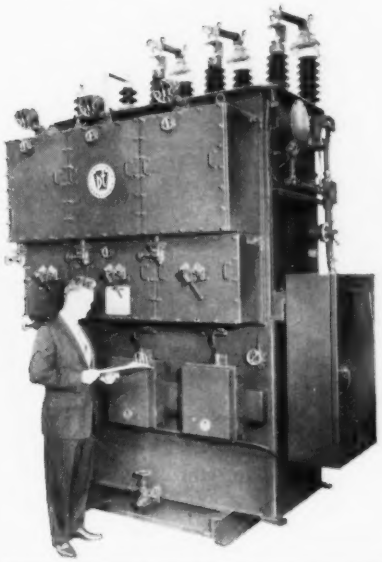

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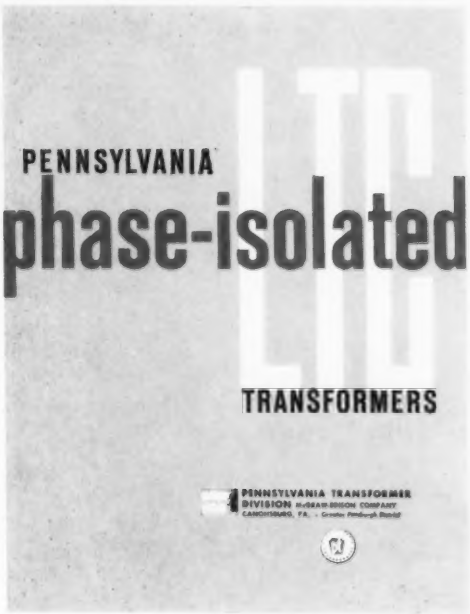

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